AR-009-423

DSTO-TR-0271

Prototype User Interfaces for Future
RAAF Command Support Systems

M. Carthigaser

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Prototype User Interfaces for Future RAAF Command Support Systems

M. Carthigaser

A Report from Task Air 93/025
"RAAF Command Support Working Group Study"

DSTO-TR-0271

ABSTRACT

Technical Report

Task Air 93/025 was a 12-month study conducted by the DSTO Command Support Systems Group which defined the broad capabilities required of a future RAAF Command Support System. A Prototype of a future RAAF Command Support System was produced to demonstrate the broad capabilities identified in the study. This document describes the user-interface and concepts demonstrated by the Prototype.

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Prototype User Interfaces for Future RAAF Command Support Systems

EXECUTIVE SUMMARY

Introduction

Task Air 93/025 was a 12-month study conducted by the DSTO Command Support Systems Group which defined the broad capabilities required of a future RAAF Command Support System. A Prototype of a future RAAF Command Support System was produced to demonstrate the broad capabilities identified in the study. This document describes the user-interface and concepts demonstrated by the Prototype.

Prototype User Interface Components

The Prototype is based on the metaphor of *desktops* and *blackboards*. Blackboards allow groups of people to work together, while desktops are used to support individuals.

The Prototype has a windows-based user interface. Desktops are private work areas that occupy the whole computer screen. Blackboards are work areas that represent specialist areas (functional cells) of the organisation, or components of the organisation (organisation units) and are represented by windows on the user's desktop. These work areas contain resources that are available to the user, such as *Information*, *Tools* and *Roles*.

Other basic user interface components include the Prototype's *Title bar* which displays the name of the current user, the *Menu bar* consisting of three menus providing System-related options, File-related options and options for defining Views, setting access privileges for Views, defining Information and modifying the Organisation Structure and Resource Allocation. *Panels* identify and provide options relating to the current position(s) held by the user.

Concepts

Several concepts have influenced the development of the RAAF CSS Prototype. The concepts were identified in the Analysis for the RAAF CSWG Study Task. Sixteen of these concepts are described in general terms and how they are specifically demonstrated in the Prototype.

The concepts include five Information-related concepts, three Work Area concepts, four concepts about Tools and four General concepts.

The Information-related concepts introduce the idea of an Information Space—a pool of information accessible from anywhere in the organisation by anyone with permission. It is used to maintain multiple representations, or views, of the same information, to meet different users' requirements. Information may be presented to users at various levels of detail, allowing users to display the information in full, or just summaries. A piece of information can have several formats, such as text or graphics. Views are formed by integrating different information formats. Several views may be combined to form further views which are created to assist users in their work and to meet their personal preferences.

The Work Area concepts describe how individuals work on desktops which are customised for the positions they hold. Groups work via blackboards, which allow people with a common interest to share information and communicate with each other. Work performed in the organisation is supported through the use of blackboards and organisation-wide tools, which enable users to access resources that are distributed across the organisation. Users also need up-to-date organisational information to ensure the best performance of the organisation, for example when the organisation's structure changes.

The Tool concepts cover several tools provided in the Prototype. One concept is concerned with the sharing of information among people, which may be accomplished with the Communications Tool. The Navigation Tool may be used to find information in the CSS, whether its existence is known or not. Users should also be able to display the current situation (Situation Awareness) and to identify any problems and opportunities relating to it (Situation Assessment). The Prototype also provides a way of creating a graphical representation of a plan, which includes situational information—a Planning Tool.

The Prototype identifies people according to a role they are assigned to perform in the organisation, as well as by name. In this way there is a separation between positions and individuals. Users of a future RAAF CSS are always aware of the organisation in which they work, and their roles within it. The user is aware of the organisation's structure, its purpose, and the different types of work performed by specialist roles—all these require explicit representation in the system. Users of a RAAF CSS vary in their positions, ranks, experience and individual preferences.

Flexibility to support all potential users should be an integral part of the system. It is also essential that a CSS has the ability to adjust to changes in the organisation which it supports—changes in the organisation's resources and structure. The RAAF CSS Prototype was designed around the ability to share ideas, understanding, information and knowledge—this Concept, therefore, necessarily includes all other Concepts.

Prototype User Interface Reference

The Prototype User Interface Reference can be used to identify and locate any element of the Prototype. The Prototype's user interface is recorded in the form of four lists: an *Icon list* (all icons used in the Prototype, identified by type, name and location), a *Positions list* (all the roles, tools and information that can be accessed by the different positions implemented in the Prototype), a *Tool list* (the tools, the people that have access to the tools and their location) and an *Information list* (the information, the people who have access to the information and their location).

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Abbreviations

ACAUST	Air Commander Australia
AHQ	Air Headquarters
ALG	Air Lift Group
AME	Alternate Mission Equipment
ATO	Air Tasking Order
ATR	Air Tasking Order Request
BSXO	Battle Staff Executive Officer
CCC	Control Co-ordination Centre
CDR	Commander
CDRALG	Commander Air Lift Group
CDRMPG	Commander Maritime Patrol Group
CDROSG	Commander Operations Support Group
CDRSRG	Commander Strike Reconnaissance Group
CDRTFG	Commander Tactical Fighter Group
Config.	Configuration
Comms	Communications
CSS	Command Support System
CSWG	Command Support Working Group
DBSXO	Deputy Battle Staff Executive Officer
DSADC	Deputy Sector Air Defence Commander
EW	Electronic Warfare
EWO	Electronic Warfare Officer
HQ81Wing	Headquarters 81 Wing
Intel	Intelligence
IntRep	Intelligence Report
IntSum	Intelligence Summary
LOGENG	Logistics and Engineering Officer
Mod.	Modification
MPG	Maritime Patrol Group
OC	Officer Commanding
OC81Wing	Officer Commanding 81 Wing
OPINST	Operations Instruction
OPORD	Operations Order
OPS	Operations
OPSCONT	Operations Controller
OPSCOORD	Operations Co-ordination Officer
OPSO	Operations Officer
OSG	Operations Support Group
Plans AD	Plans Air Defence
Plans CE	Plans Communications Equipment
Plans TF	Plans Tactical Fighter
RAAF	Royal Australian Air Force
ROE	Rules of Engagement
SADC	Sector Air Defence Commander

SADEX	Sector Air Defence Executive Officer
SADMINO	Senior Administration Officer
SADOC	Sector Air Defence Operations Centre
SAR	Search and Rescue
SCC	Sensor Co-ordination Centre
SHO	Senior Health Officer
SLO	Senior Logistics Officer
SOPSO	Senior Operations Officer
SQN	Squadron
SRG	Strike Reconnaissance Group
SSUPO	Senior Supply Officer
STANDO	Standardisation Officer
SUPO	Supply Officer
TFG	Tactical Fighter Group
WEAPO	Weaponeering Officer
WFSO	Wing Flying Safety Officer
WIMP	Windows, Icons, Mouse and Pull-down menus

1. Introduction

1.1. Task Air 93/025: RAAF Command Support Working Group Study

Task Air 93/025 was a 12-month study conducted by the DSTO Command Support Systems Group which defined the broad capabilities required of a future RAAF Command Support System. A Prototype of a future RAAF Command Support System was produced to demonstrate the broad capabilities identified in the study. This document describes the user-interface and concepts demonstrated by the Prototype.

1.2. Prototype

A Prototype of a future RAAF Command Support System was produced as part of Task Air 93/025. The Prototype is used to present a visual demonstration of the concepts identified in the Analysis—concepts which we believe should be incorporated into a future Command Support System.

The Prototype was implemented for Microsoft Windows 3.1, using Microsoft Visual Basic 3.0 with the Microsoft Access 1.1 database engine and MicroHelp's VBTools 3.0 add-on. The Prototype produced is solely a concept demonstrator, however, whose level of functionality is sufficient only to demonstrate the concepts described.

There are two versions of the Prototype—the basic Prototype, and one tailored to specific demonstrations. Any differences in the user interfaces between these versions are cited in this document.

1.3. Document

The aim of this document is to present the user interface for the RAAF CSS Prototype and hence the general user interface requirements for a future RAAF CSS. In this way, the concepts identified in the Analysis may be visualised. Please note that all data presented in this document are fictitious.

1.4. Readers

It is assumed that readers are familiar with the RAAF organisation, the Microsoft Windows user interface, prototypes (concept demonstrations in particular), and Command Support Systems.

1.5. Other Documents

Other documents produced for Task Air 93/025:

- *Final Report of Task Air 93/025 RAAF Command Support Working Group Study* [1]

  Addresses the broad capabilities required of RAAF Command Support Systems. This document includes a context analysis of RAAF Command Support Systems in relation to RAAF information systems and other ADF

Command Support Systems, and defines the concepts and capabilities required of future RAAF Command Support Systems.

- *RAAF Command and Control: An Organisational Analysis Perspective [2]*

  Identifies the decisions made and the key decision-makers at a representative set of RAAF Command Centres. The information required to support these decisions is documented from an organisational perspective.

- *Prototype Technical Documentation [3]*

  The technical documentation for the Prototype developed.

- *An Operator's Perspective of RAAF Command Support Systems [4]*

  Demonstrates how a RAAF Command Support System can be used to support RAAF personnel. This document shows the types of tasks performed by RAAF personnel, and links these tasks to the *RAAF Command and Control: An Organisational Analysis Perspective [2]* and *Prototype User Interface for Future RAAF Command Support Systems* documents.

2. Prototype User Interface Components

This section describes the screen layout for the Prototype, using CDRTFG as an example user.

The Prototype is based on the metaphor of desktops and blackboards. Blackboards allow groups of people to work together, while desktops are used to support individuals.

The Prototype has been implemented using Microsoft Windows 3.1, a Windows, Icons, Mouse and Pull-down menus (WIMP) user interface.
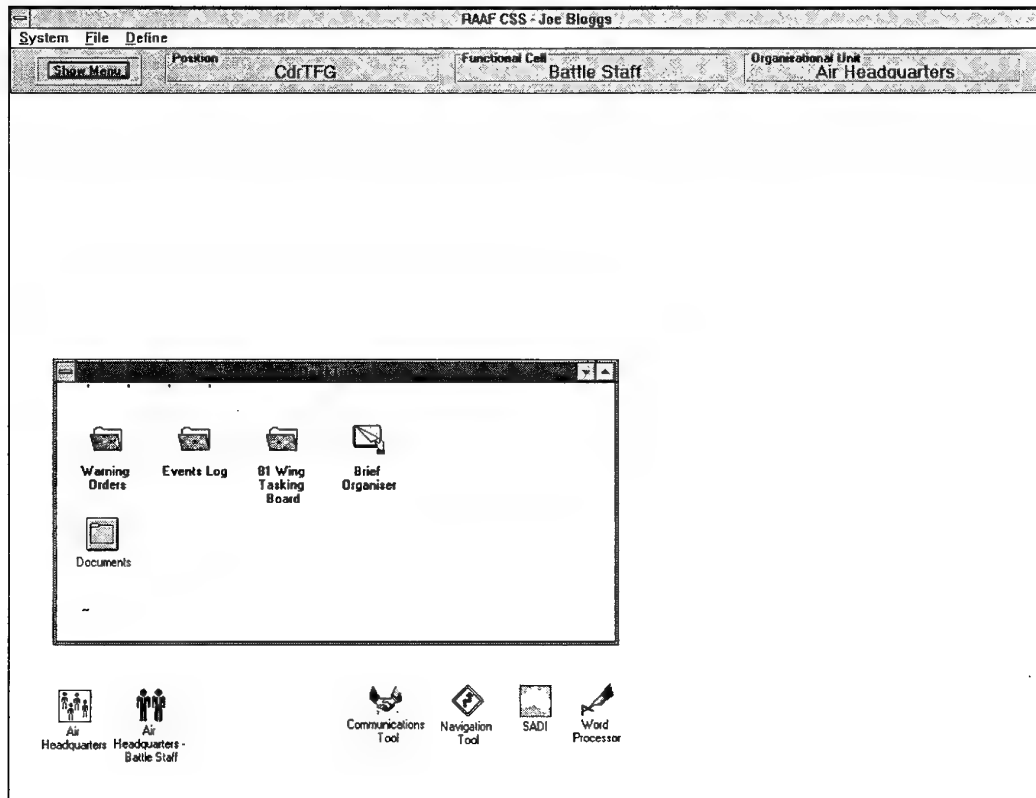
Figure 1.   CDRTFG's Desktop.

The screen display shows the users' interface to the RAAF CSS Prototype. It is through this screen that users carry out their work, communicate with others, and search and retrieve the information they require.

The layout of the screen is expected to be completely customisable in its display; users should have the power to choose what information is visible and where the information is positioned on the screen. The system, however, imposes some restrictions upon users such as access privileges.

The basic interface components which exist for all users are described below.

Figure 2 identifies the title bar, menu bar and panel located at the top of the screen.
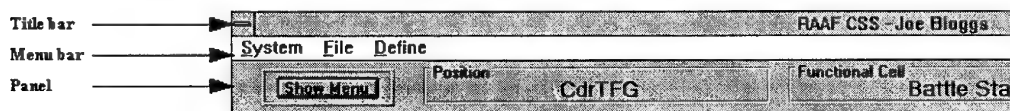
Figure 2.   Title bar, menu bar and panel.

2.1. Title Bar

The title bar displays the name of the current user. Users have the option of supplying their name when they log-on to the system. The example shows that CDRTFG is AIRCDRE Joe Bloggs.

2.2. Menus

The main menu bar contains three menus: System, File and Define.

2.2.1. System Menu
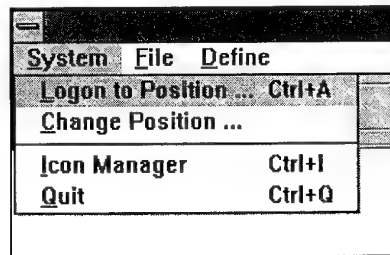
Figure 3.   System menu.

Logon to Position	This option displays the LOGON screen and sets up the desktop for the selected position. Note that a user may be logged on as two positions concurrently.
Change Position	This option has not been implemented.
Icon Manager	A prototype developer's option.
Quit	This option is used to exit the prototype and return to the Microsoft Windows desktop.

2.2.2. File menu
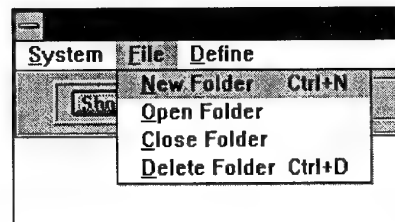
Figure 4.   File menu.

The File menu options have not been implemented.

2.2.3. Define menu
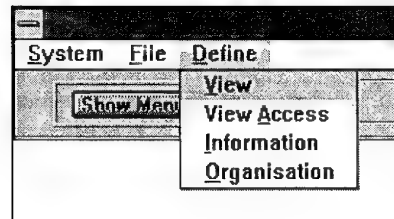
Figure 5.   Define menu.

View	This option launches the View Tool.
View Access	This option launches the Access Tool.
Information	This option launches the Information Tool.
Organisation	This option launches the Organisation Structure Tool/Resource Allocation Tool.

2.3.   Panel

The main panel displays details of the current user, which includes the user's position and the functional cells and organisation units to which the user belongs. The menu on the left contains position-related options.

Note that each user may log-on as two positions concurrently, and that one panel is displayed for each position.

2.3.1. Panel Menu
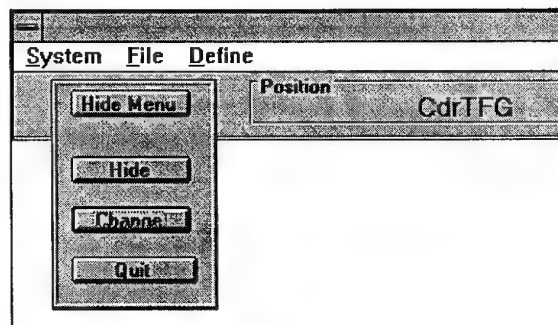
Figure 6.   Panel menu.

Hide(Show)	This option disables (hides) or enables (shows) the position's information and tools. This button toggles between "Hide" and "Show".
Change	This option changes the position of the user. This involves logging off as the current position and logging on as another.
Quit	This option is used to quit the current position.

2.4. Work Areas

There are three different types of work areas: desktops, functional cell blackboards and organisation unit blackboards, all of which are described below.

2.4.1. Desktops

The whole computer screen is defined as a user's desktop. A form labelled *Desktop* is used to display all information and tools specific to the current user. Information and tools that are common to all users, such as the Mapping Tool, Navigation Tool and the Communications Tool all appear at the bottom of the screen. This separation is implementation-related and therefore should be ignored. Information and tools on the *Desktop* form and those on the Microsoft Windows desktop should be treated equally.

A desktop is shown in Figure 7.

2.4.2. Functional Cell Blackboard

The functional cell blackboard is a group work area related to a specialist area of the organisation. The blackboards contain the information, tools and roles that can be accessed by members of the group. CDRTFG belongs to the Battle Staff functional cell.

A functional cell blackboard is shown in Figure 8.

2.4.3. Organisation Unit Blackboard

An organisation unit blackboard is a group work area related to an organisation unit of an organisation. The blackboard contains the information, tools and functional cells that can be accessed by members of the group. CDRTFG belongs to the Air Headquarters organisation unit.

An organisation unit blackboard is shown in Figure 9.

Figure 7.   A desktop.

Minimised Blackboard	Maximised Functional Cell Blackboard
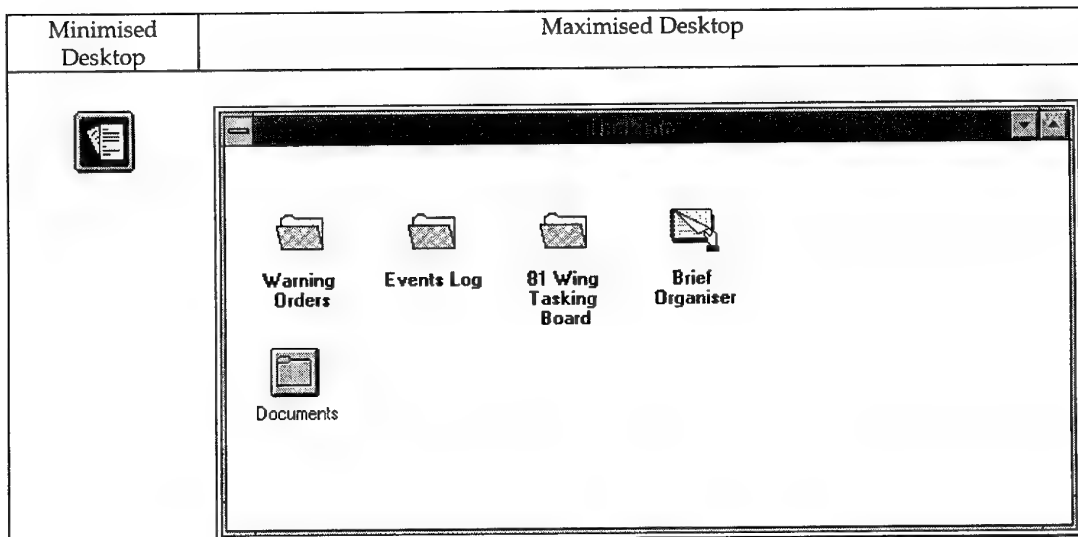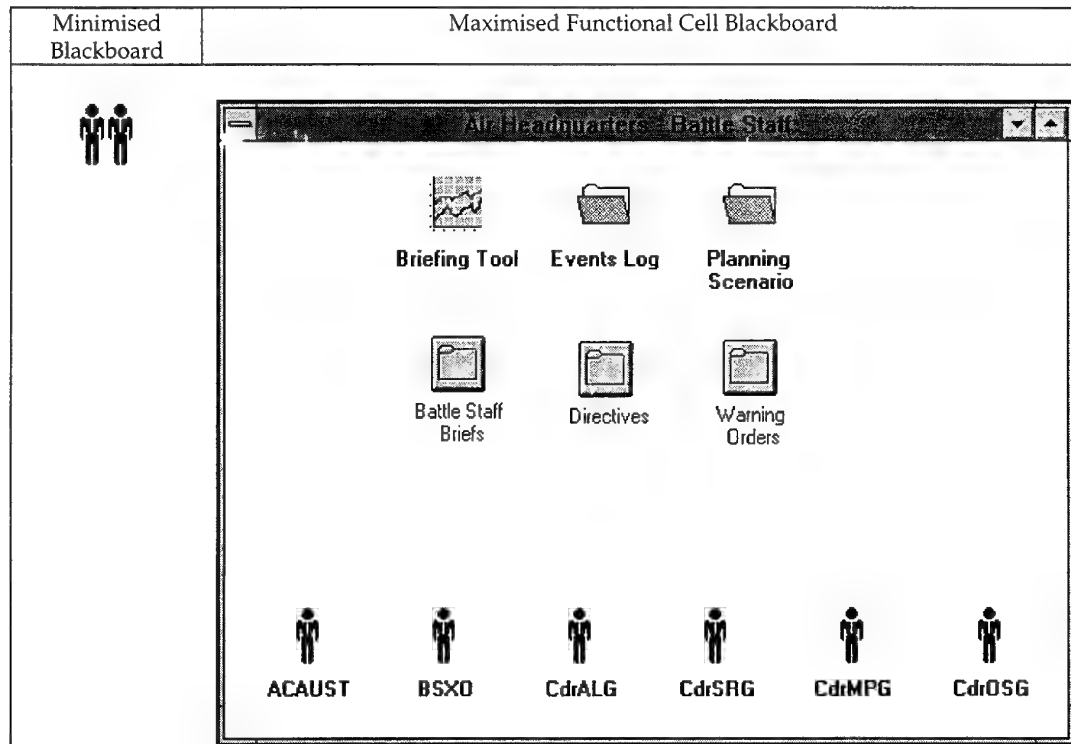
Figure 8.   *A functional cell blackboard.*

Minimised Blackboard	Maximised Organisation Unit Blackboard
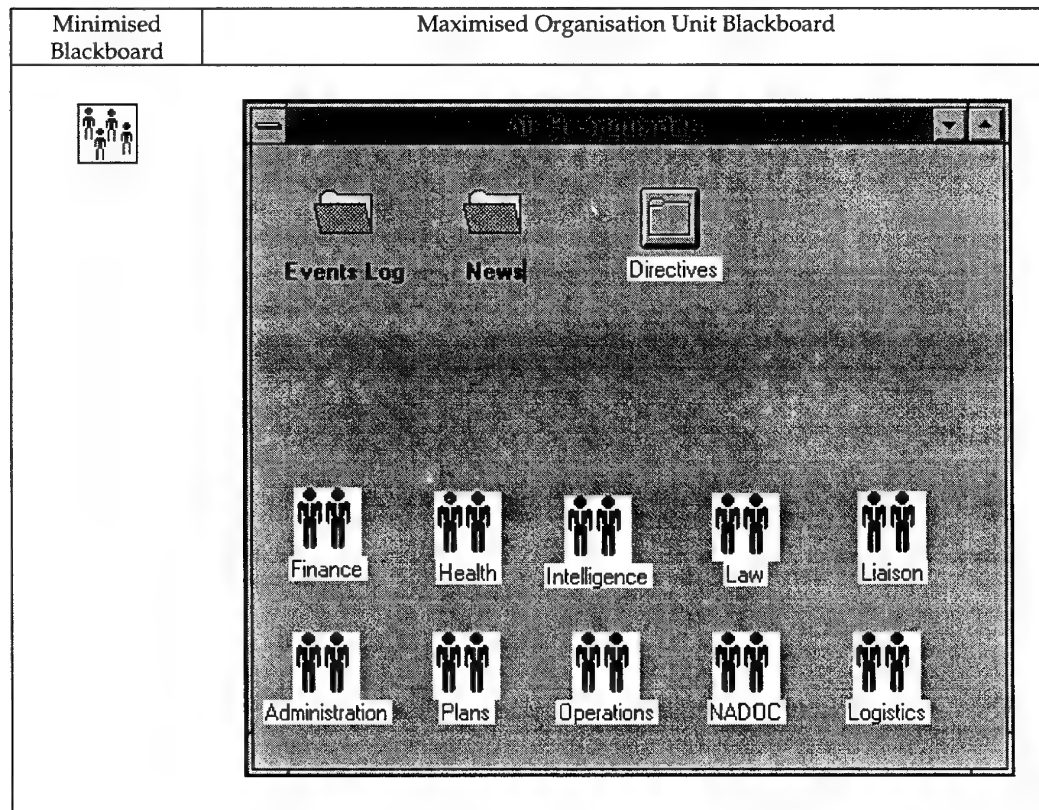
Figure 9.   *An organisation unit blackboard.*

2.5. Tools
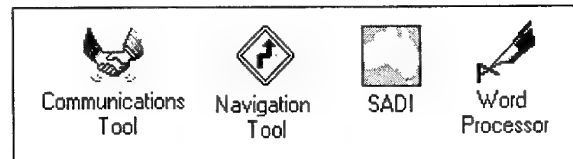
Figure 10. Tools.

The Communications Tool, Navigation Tool, Brief Organiser, Situation Awareness Display (SADI) and Word Processor are examples of tools which CDRTFG uses to create and manipulate information.

2.6. Information

Figure 11. Information.

Warning Orders, the Events Log and the 81 Wing Tasking Board, are examples of information which CDRTFG uses.

3. Concepts

Several concepts have influenced the development of the RAAF CSS Prototype. This section documents the Prototype user interface in terms of 16 of the concepts.

Note: For full details of the concepts identified in the RAAF CSWG Study task, please refer to the following documents:

RAAF Command and Control: An Organisational Analysis Perspective [2]

and

An Operator's Perspective of RAAF Command Support Systems [4].

The concepts are listed below. The first five are information-related concepts; the next three are related to work areas; the next four are about tools; and the remaining four are general concepts.

Information-related concepts

- Information Space.
- The extraction of detailed information from general information (to *drill-down*).
- A piece of information can have several formats.
- The integration of different information formats to form a view.
- The integration of different views.

Work Areas

- The ability to support work for individuals.
- The ability to support work for groups.
- The ability to support work for the organisation.

Tools

- Communication.
- Find.
- Situation awareness and assessment.
- The ability to create and visualise plans.

General concepts

- The separation of positions and individuals.
- Organisation awareness.
- Flexibility and adaptability of CSS.
- Share.

3.1. Information Space.

An Information Space is a pool of information accessible from anywhere in the organisation, by anyone having the required permission. It is used to maintain multiple representations or views of the same information to meet different users' requirements.

The advantage of using an information space is that it is implementation-independent, and allows information to be defined and modified at runtime. Information is accessed independently of underlying networks and databases ensuring a separation between the implementation and the use of the information.

How the Prototype Demonstrates This

The *Information Space* produced for the Prototype concentrated initially on tasking information. The intention was to use this information to integrate elements related to

tasking, since the documents, the document lists and the boards can be regarded as views of the same pool of tasking information.

The information space was extended later to include organisation structure and organisation resource information.

3.1.1.1.Example: INFORMATION

Information is declared by starting with the basic information components called *attributes* and grouping them to form *objects*. Data stored in such objects is information available to the organisation.

Figure 12 shows the Define Information window accessed from the *Define* menu of the Prototype—the interface to the Information Space. It is used to create objects and to add and display object data.
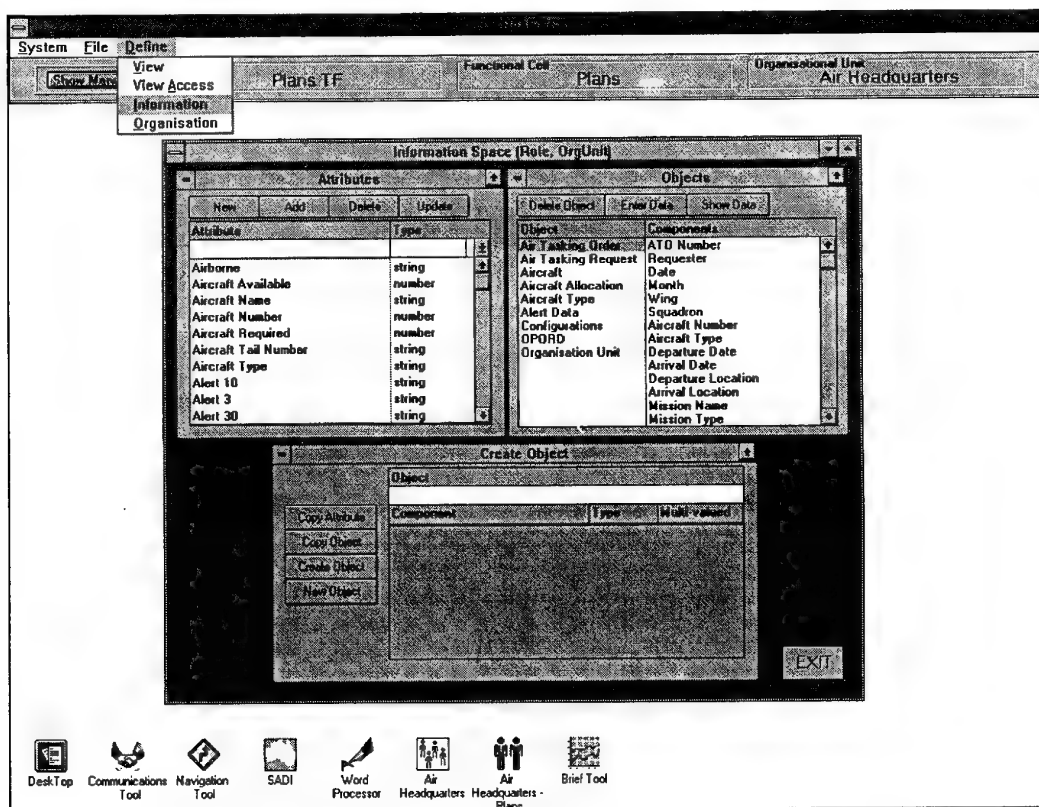
Figure 12.   Interface to Information Space.

3.1.1.2.Example: VIEWS

The Prototype supports three types of views: these are documents, document lists and boards. Such views are based on the tasking information in the information space.

The following screen-images show how each type of view is defined.

Define View screens are entered by selecting the *Define View* menu option from the *Define* menu of the Prototype. Views may be created, deleted or modified through these screens.

Figure 13 illustrates the definition of an Air Tasking Order document view. The components of this view are selected from an existing Air Tasking Order object in the information space. The number and order of these document view attributes may be chosen to suit different users.

Figure 14 shows how the Air Tasking Order Request document list view was formed. The attributes for a document list are selected from existing document views in the information space. The number and order of the document list attributes may be chosen to suit different users.

Figure 15 gives an example of how a board view is defined. This screen shows the 81 Wing OPS tasking board, which has a timescale as column headings, aircraft numbers grouped by squadrons for row headings, and a function bar across the top. Note that squadrons which belong to 81 Wing are selected from the organisation structure hierarchy.
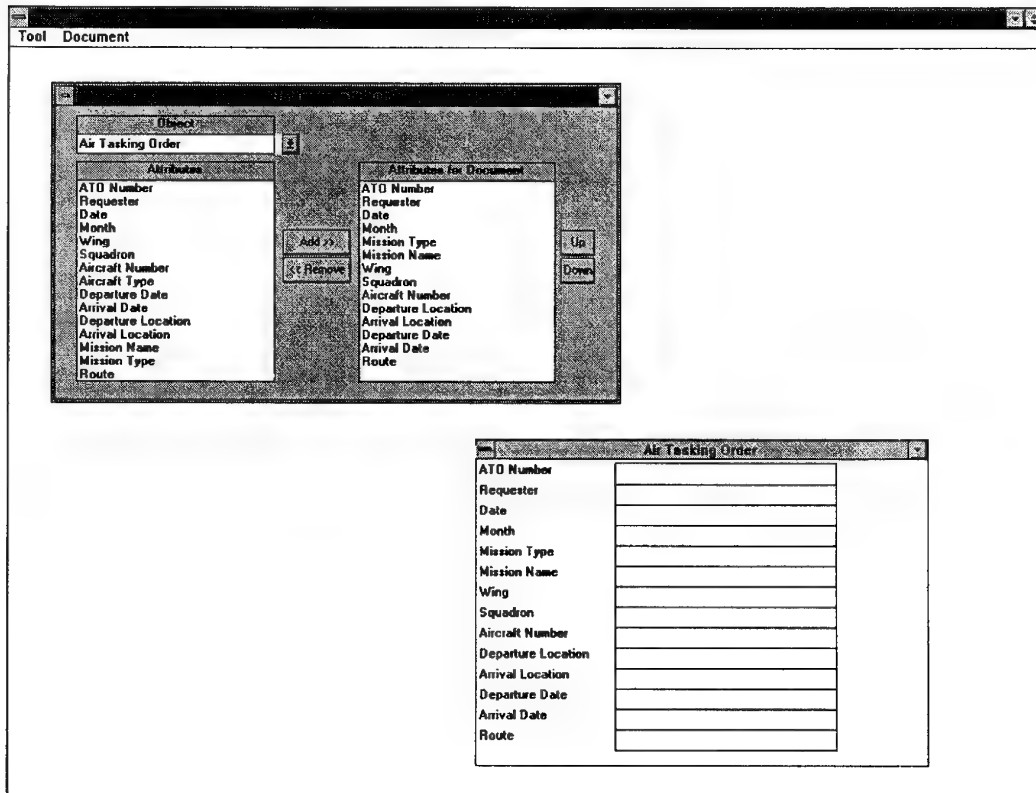
Figure 13.   Defining a Document view (Air Tasking Order).
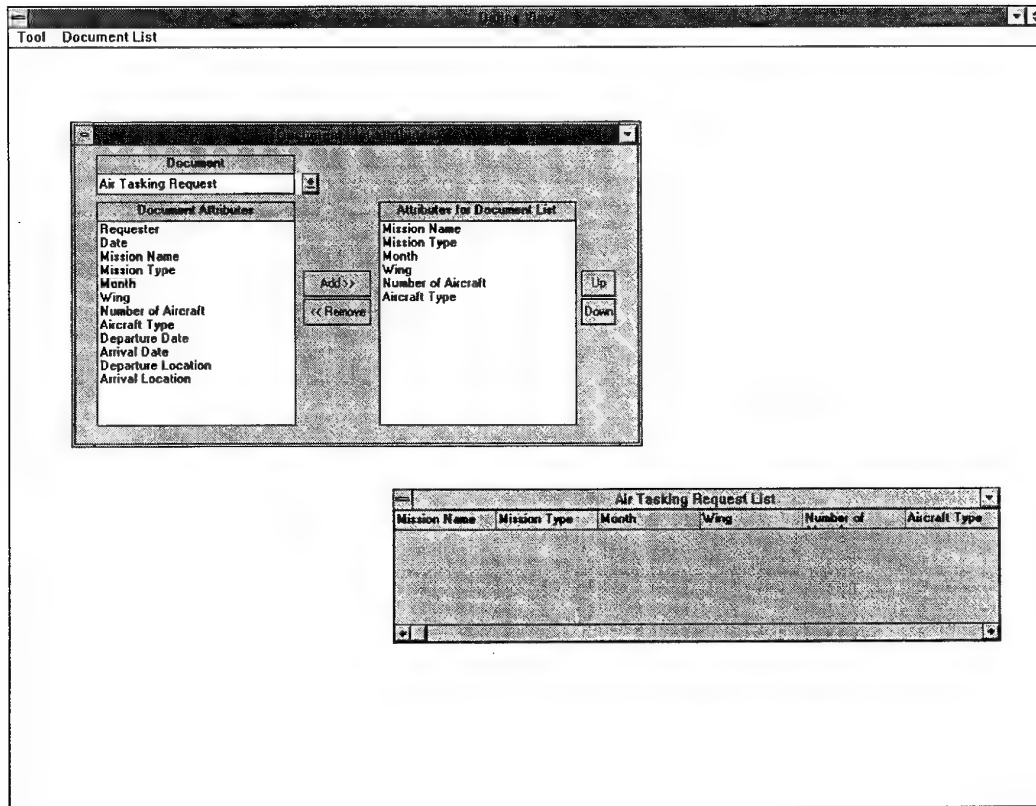
Figure 14.   Defining a Document List view (Air Tasking Order Request list).
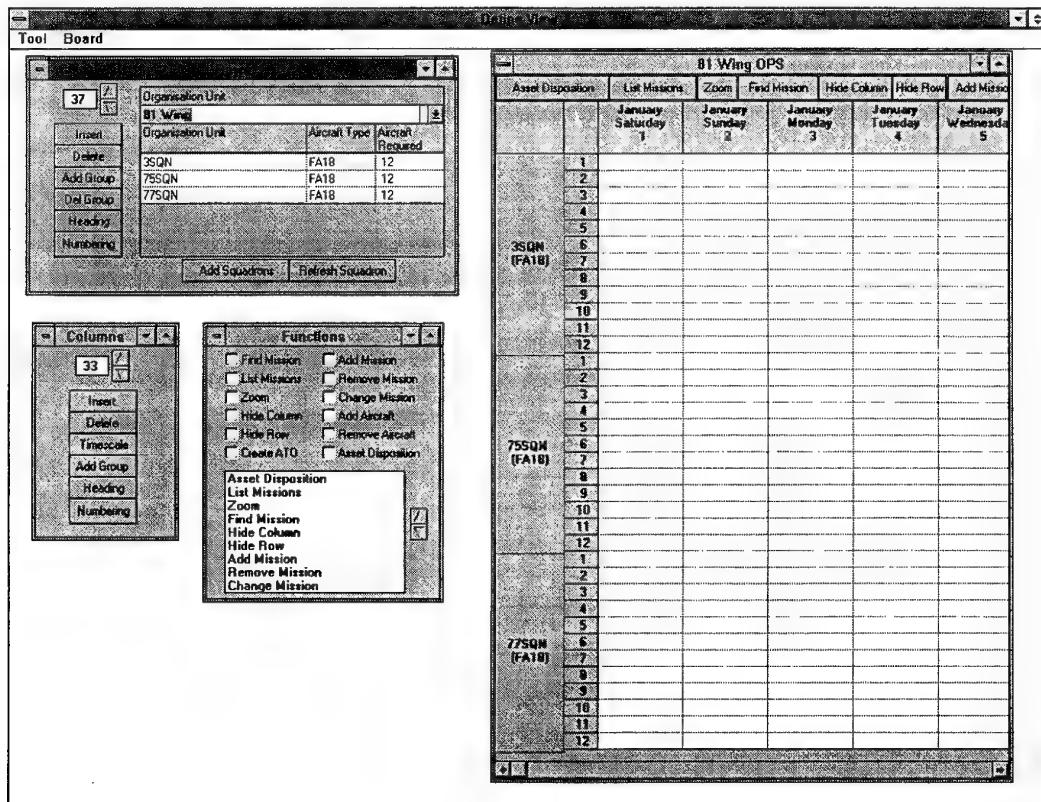
Figure 15.   Defining a Board view (81 Wing OPS Tasking board).

Things Not in Prototype

Relating views to roles within the organisation, and their associated access rights, has not been implemented. The definition but not the application of this is included in the Prototype.

3.2.   The Extraction of Detailed Information from Some General Information (*Drill-Down*)

Information may be presented at various levels of detail. All available details may be displayed in full, or summarised to selected degrees.

It should be possible to obtain greater detail relating to certain information, if such detail is available. Conversely it should be possible also to suppress detail to get overviews.

Users should be able to increase or decrease the level of detail presented, as they require.

How the Prototype Demonstrates This

Details are identified as either details inherent in information or details by association.

3.2.1.1.Example: TASKING BOARD—Details Inherent in Information

A Wing tasking board shows missions scheduled for squadrons, arranged according to time. Missions are represented by colour-coded bars. Broad area views of the board shows the workload for squadrons across a certain period of time; with the colours indicating the different types of missions they are scheduled to perform. In this way an overview for periods of, say, one to three months can be obtained.

Narrowing the focus to particular sections of the board, and expanding what can be seen in those areas enables the viewing of more detailed information. This can be achieved by use of the Prototype tasking board's zoom function. Zooming in to computer representations of the tasking board simulates stepping closer to a physical board. As you get closer, finer details previously unreadable from a distance can now be seen more clearly—for example, users can direct their attention to the activities of single squadrons over a period of, say, a day. As well, users can read mission-related details such as routes, types of missions, and associated ATO numbers, directly from the board itself. By zooming in and out of the board, users can control the amount of detail presented.

Figure 16 shows how to use the zoom function for the 81 Wing OPS tasking board.

3.2.1.2.Example: TASKING BOARD—Details by Association

The coloured bars on tasking boards, as mentioned above, show what missions squadrons are scheduled to complete, with brief mission details attached. Associated with each mission are possibly several documents which can be retrieved directly from tasking boards. In this way, more detailed information on missions can be extracted from general information—for example, an Air Tasking Order may be retrieved and viewed simply by selecting the desired mission on the board and, from a list of available documents, selecting which document is desired.

Figure 17 shows the retrieval of an Air Tasking Order from the 81 Wing OPS tasking board.
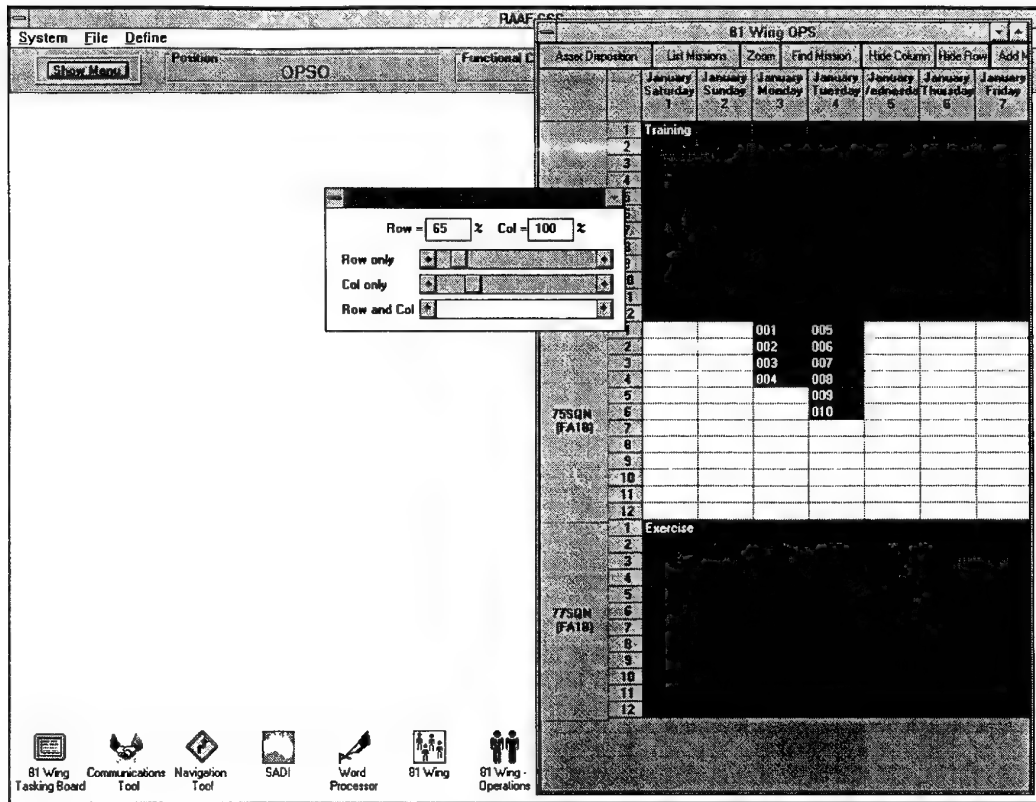
Figure 16.   Tasking board Zoom function.
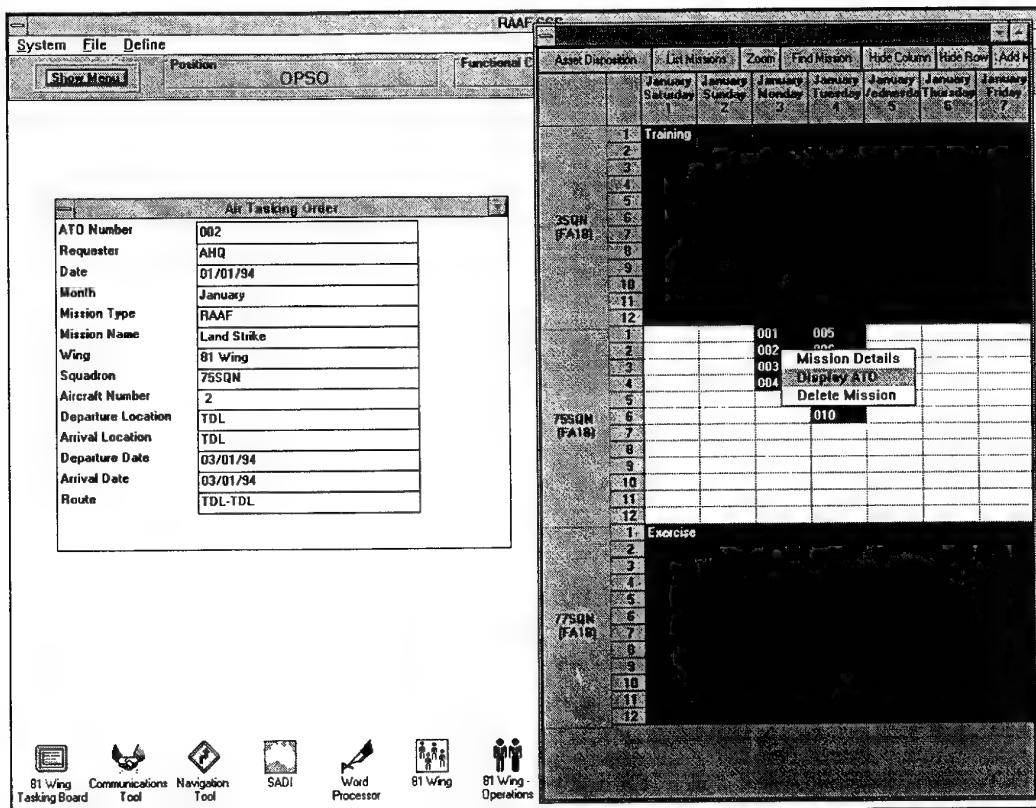
Figure 17.   The retrieval of an Air Tasking Order from the 81 Wing OPS tasking board.

3.2.1.3.Example: MAPPING TOOL—Details Inherent in Information

A Mapping Tool is equipped with various functions which control the users' views of map data. Its Zoom function can increase or decrease the scale of maps—for example, by zooming from an overview of the whole of Australia down to a view of the top-end of the country increases the scale and hence the amount of information displayed on the map.

   Users can also select the information shown on maps at any time—for example, objects representing bases, ships, aircraft, and other general assets can be switched on or off, as desired.

   Figure 18 shows the Darwin region of Australia with bases, aircraft tracks and ships displayed.

3.2.1.4.Example: MAPPING TOOL—Details by Association

Users can *drill-down* further and retrieve detailed information relating to map objects simply by clicking on the various map symbols—for example, Figure 19 presents a screen display showing details of resources located at Tindal air base.
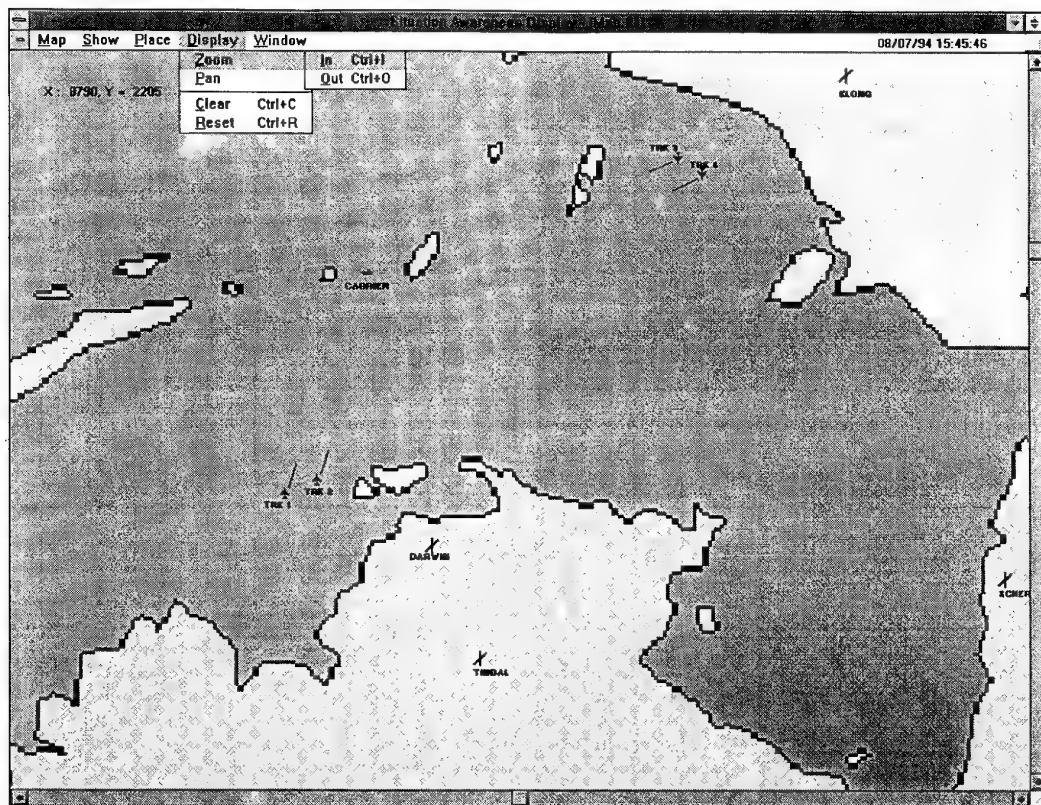
Figure 18.   A mapping tool displaying bases, aircraft tracks and ships.
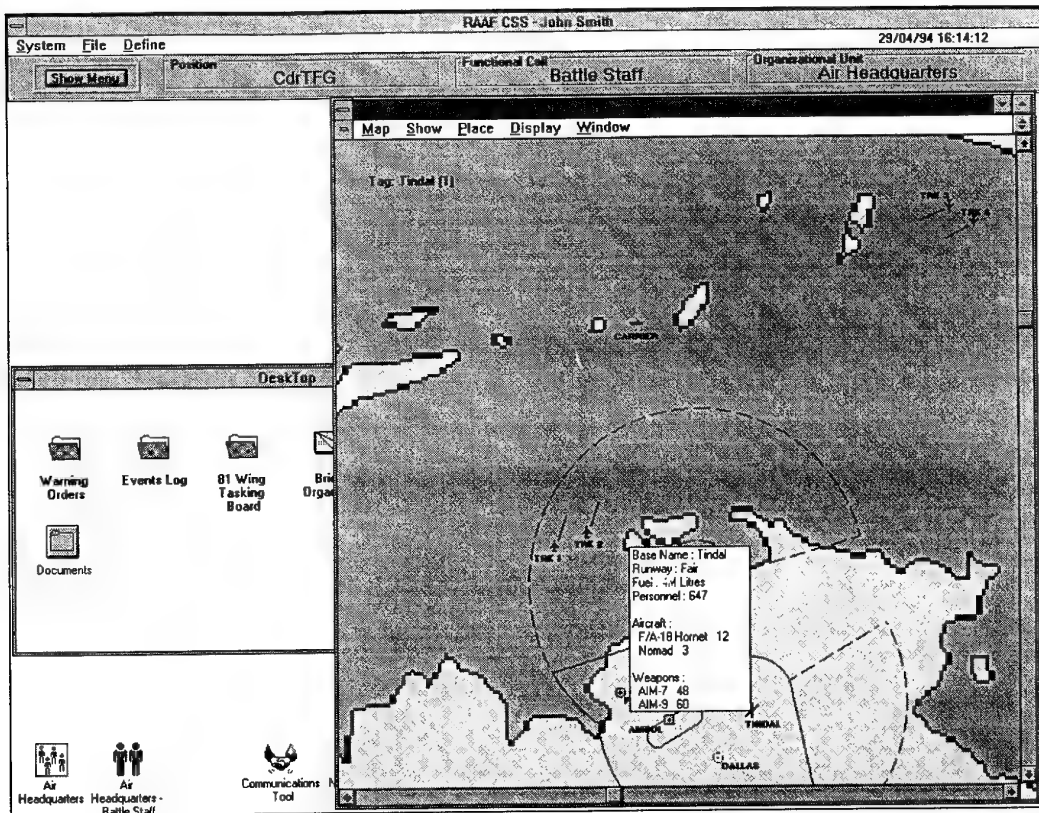
Figure 19. Details of resources located at Tindal.

Implementation Notes

These descriptions have highlighted the advantages and disadvantages of computer tasking boards when compared with physical boards. The transition from an overview to detail is easier with a physical board, while the advantage of computer-based tasking boards is that documents may be linked to them.

Things Not in Prototype

A tasking board for Air Headquarters, which summarises the information from all the wings.

3.3. A Piece of Information can have Several Formats

A piece of information can have several formats, such as text or graphics.

```
          ┌─────────────────┐
          │   Information   │
          └─────────────────┘
allows greater assimilation      │ format
of information content           ▼
          ┌─────────────────┐
          │    Formatted    │──────▶  display to user
          │   Information   │
          └─────────────────┘
```
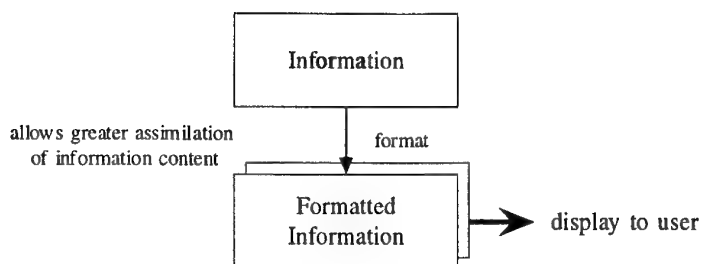
Figure 20.   A piece of information can have several formats.

The appearance of information affects its interpretation by users—and some formats are more suited to certain purposes than to others. Formats should be chosen for selected pieces of information, therefore, which make the assimilation and interpretation of that information most efficient.

How the Prototype Demonstrates This

3.3.1.1.Example: SITUATION AWARENESS DISPLAY

Situation information is recorded as plain text or, equivalently, as map displays. The information content is identical—but it may be interpreted and valued differently by different users. Instead of limiting situation awareness information to any particular format, the Prototype allows users to choose the most suitable formats for displaying information.

In the screen display shown in Figure 21, information on the location of aircraft is obtainable in different formats. A symbol shows where the aircraft is located in relation to other surrounding objects. The map grid co-ordinates of the aircraft are displayed as well—in text format—at the top right hand corner of the screen.
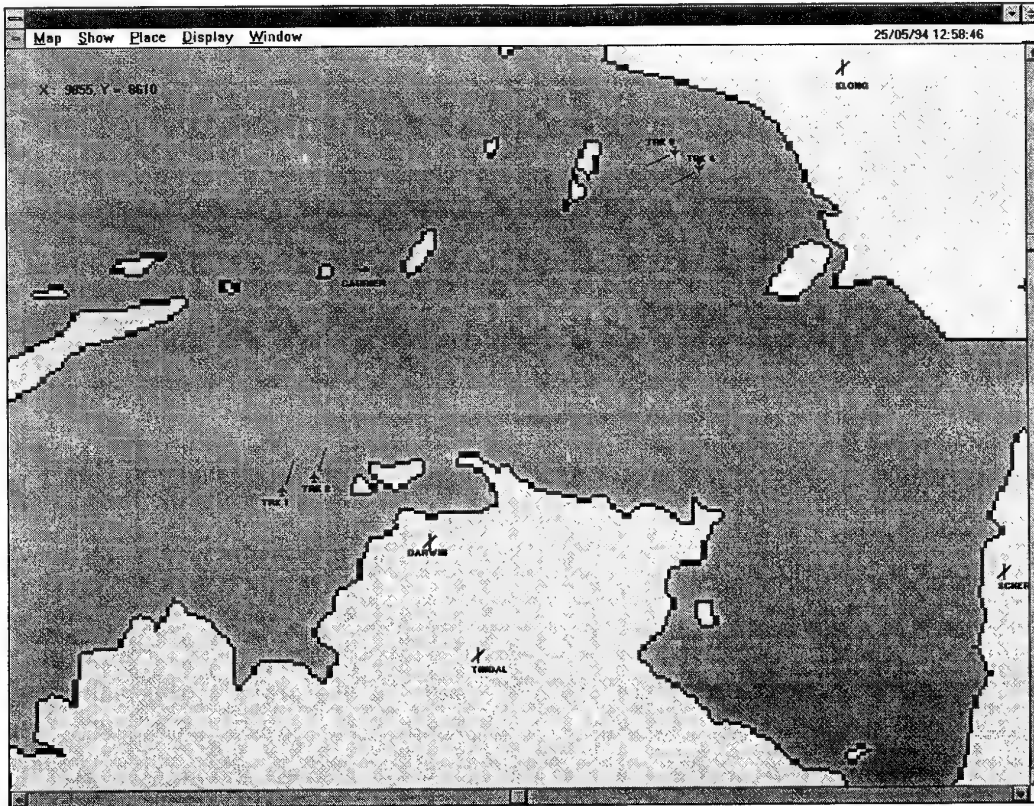
Figure 21. Map information presented in different formats.

Other Notes

See Annex A: Integration of information diagrams.

3.4.   The Integration of Different Information Formats to Form a View

Information may appear in a variety of formats such as text, graphics and tables. A view is the combination of various pieces of information which have been organised for the purpose of performing tasks. The effect of assembling and integrating various information formats is to create a View.
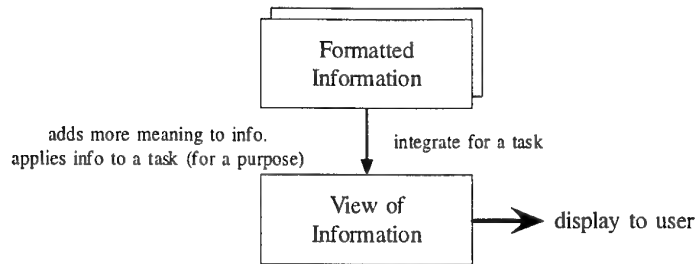
Figure 22. The integration of different information formats to form a view.

How the Prototype Demonstrates This

3.4.1.1.Example: BRIEF ORGANISER

The Brief Organiser provides the most obvious example of how different information formats can be combined. The Prototype presents examples of briefs, in which text, tables, charts, pictures, slides, sound and video are combined (refer Figure 23). The information may come from many different sources and may have been produced for various reasons. The resulting brief, however, is a rearrangement or a new view of the existing information whose storage and retrieval is transparent to users.
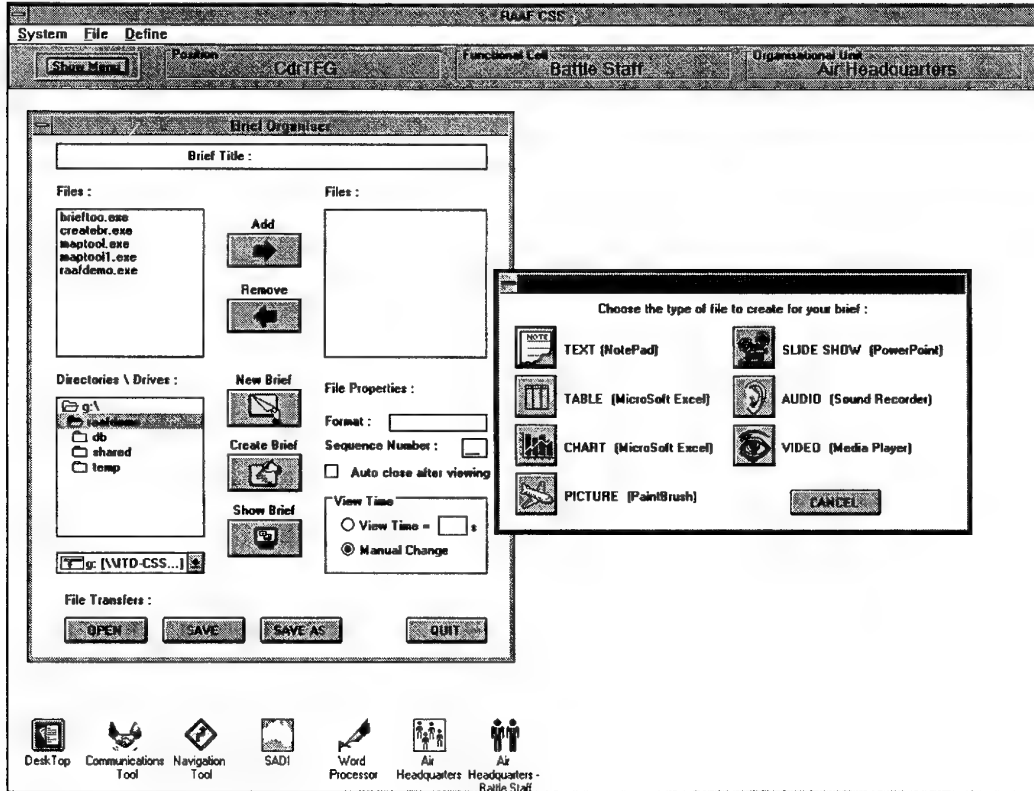
Figure 23. The integration of different information formats to form a brief.

Other Notes

Linking information components to produce a brief is achieved explicitly by users.

A *Brief* is an example of a View. In this document, the kinds of views created by the Prototype comprise mainly documents, document lists, and boards.

See Annex A: Integration of Information diagram.

3.5. The Integration of Different Views

Information may be displayed in different views such as boards, documents or document lists. Multiple views of information may be integrated to assist users in performing tasks.
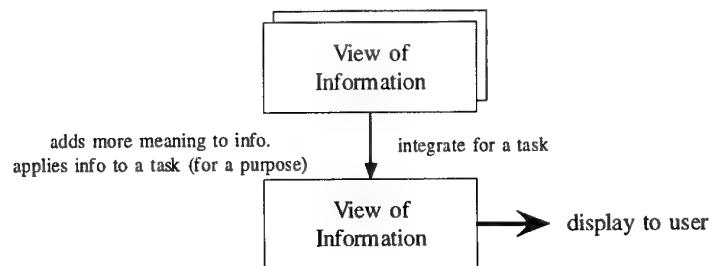
Figure 24. The integration of different views.

How the Prototype Demonstrates This

3.5.1.1.Example: TASKING BOARD

A Wing tasking board provides an overview of missions which squadrons are scheduled to perform over a period of time. Concise details are attached directly on the board for each mission—more detailed air tasking information is kept in document form. Boards and Documents are two types of views that can be created in the Prototype. Air tasking documents such as Air Tasking Requests and Air Tasking Orders may be retrieved interactively from the board—refer Figure 17 which illustrates how a board and its related documents are integrated in a complementary and seamless way.

Other Notes

Linking different views is achieved implicitly—based on semantics.

See Concept: Information Space (Section 3.1).

See Annex A: Integration of Information diagram.

3.6. The Ability to Support Work for Individuals

The RAAF CSS Prototype is viewed from the perspective of individual users. The whole computer screen represents users' private work areas known as *desktops*—the interfaces through which users communicate with others, search for and retrieve required information, and complete their work tasks.

Individuals perform roles, often multiple roles, in the organisation, and interact with the CSS from that role's perspective. Users have the option to customise their desktops, locating and presenting the information and tools they need in a way which best supports their work and meets their personal preferences.

Other work areas, known as blackboards, also appear on desktops, enabling individuals to communicate and share information with others having similar interests. Each blackboard represents a specific group of people.

How the Prototype Demonstrates This

3.6.1.1.Example: OPSO, 81 WING, TACTICAL FIGHTER GROUP

An OPSO at a Wing has a desktop that is customised for air tasking. The Wing tasking board is a tool which is frequently used by the OPSO, and is easily accessible from the desktop. Information such as a list of new Air Tasking Order Requests assists the OPSO in his work—this list is customised specifically for the OPSO.

Figure 25 shows the OPSO at 81 Wing's desktop, along with a tasking board and new Air Tasking Order Request list. In this example, the OPSO belongs to two groups: the organisation unit 81 Wing, and the functional cell 81 Wing Operations—blackboards corresponding to these two groups are shown on the desktop in Figure 26.
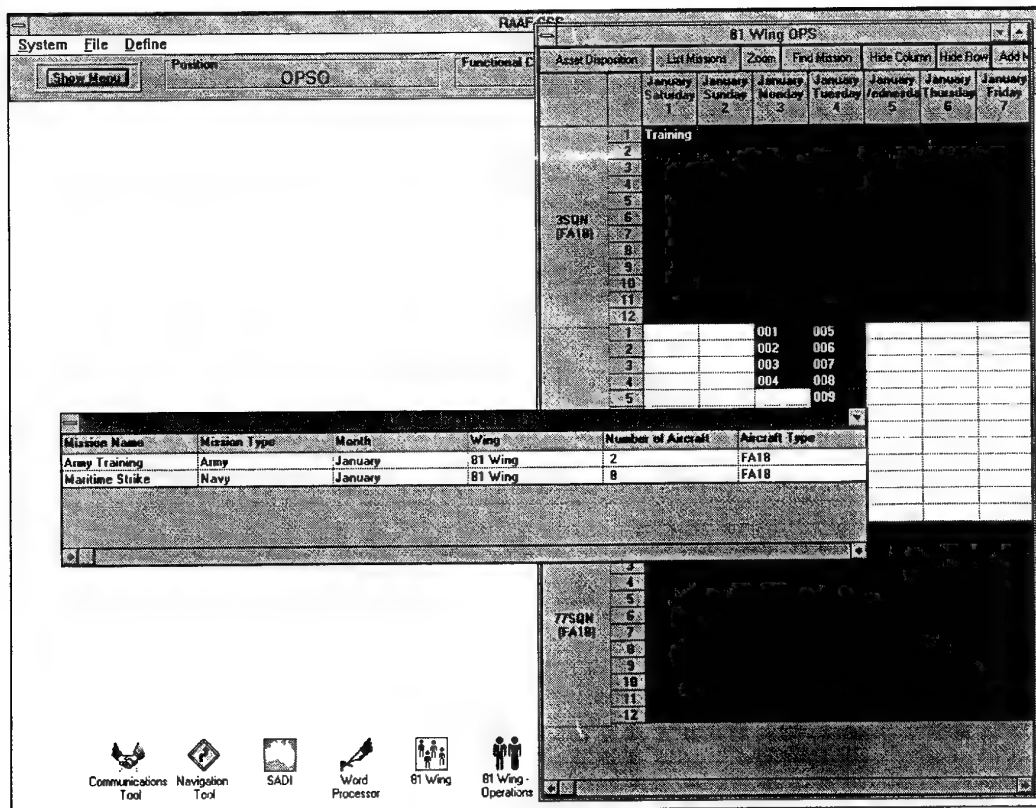
Figure 25. OPSO 81 Wing's desktop with Tasking board and new Air Tasking Order Request List.

Implementation Notes

The whole computer screen is defined to be the user's *desktop*. A form labelled *Desktop* is used to display all the information and tools that are specific to the current user. Information and tools that are common to all users (such as the Mapping Tool, Navigation Tool and the Communications Tool) all appear at the bottom of the screen. This separation is implementation-related. Information and tools on the form labelled *Desktop* and those on the Microsoft Windows desktop should be regarded with equal emphasis.

Other Notes

See Concept: The ability to support work for groups (Section 3.7).

Things Not in Prototype

A way of customising an individual's desktop.

The ability to define views, without applying them to roles, is included in the Prototype. That is, the presentation of information and tools can be defined but they cannot be selected and positioned for particular roles.

3.7. The Ability to Support Work for Groups

People having common interests may communicate with each other and share information as they carry out their work tasks. Group work is supported by blackboards.

Groups may be related to the structure of the organisation. The form and membership of these formal groups change as the organisation changes. Alternatively, groups may be created dynamically. The commonality among the members in these informal groups is the reason for their formation—membership is not pre-defined.

Individuals may belong to several groups simultaneously, and may contribute differently to each of them. It is also possible for group members to be dispersed physically.

Blackboards are the assigned work areas for groups, and contain common information and tools. These work areas are located on individuals' desktops. Blackboards represent a group and therefore express the group's resources. Individuals complete their work tasks in the privacy of their desktops, but make information and tasks available publicly by moving them into common group areas.

Blackboards, also enable direct communication between roles in groups.

How the Prototype Demonstrates This

3.7.1.1.Example: OPSO, 81 WING, TACTICAL FIGHTER GROUP

The 81 Wing OPSO shares specialist Operations knowledge with other staff in the Operations functional cell. Resources specific to 81 Wing are associated with the 81 Wing organisation unit. These are two examples of organisational groups supported by blackboards.

In the Prototype, *blackboards* appears as separate windows which users can move, resize or minimise. Only members of a group are allowed to access their group's blackboard. Access privileges of information and tools contained in a blackboard may vary across the group.

Information can be displayed and tasks launched from blackboards—by activating their respective icons. Other symbols represent roles and sub-groups. The Logistics functional cell sub-group of 81 Wing is illustrated with nested blackboards—the Logistics blackboard is contained within the 81 Wing blackboard.

Figure 26 shows the 81 Wing OPSO's desktop, with 81 Wing—Operations functional cell blackboard and 81 Wing organisation unit blackboard.
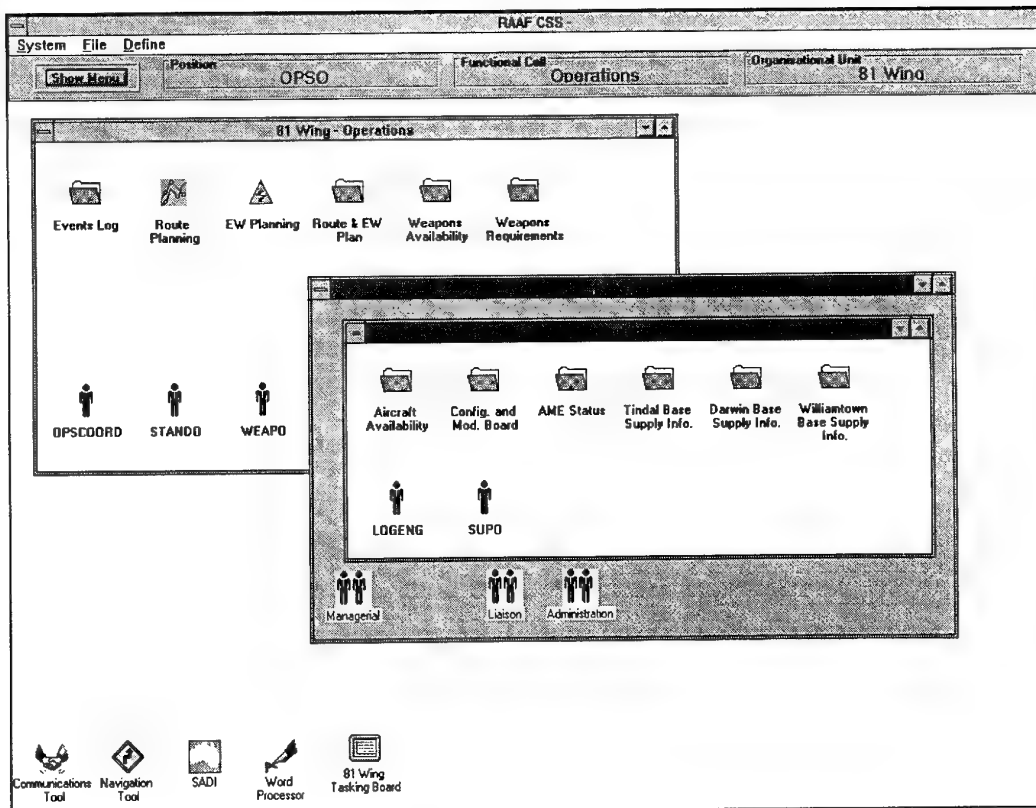
Figure 26. 81 Wing OPSO's desktop with Functional Cell and Organisation Unit blackboards.

Things Not in Prototype

There are no examples of dynamically-created group work areas in the Prototype. These blackboards would be created to support groups of unpredictable membership to handle unexpected events. They would demonstrate the flexibility of the CSS.

How tasks are shared in groups using blackboards is not demonstrated.

3.8.   The Ability to Support Work for the Organisation

The CSS supports the work of individuals and groups by providing special work areas for them. Work tasks for the organisation are performed in these work areas, and through the use of organisation-wide tools. Users need to access resources which are distributed across the organisation. Blackboards and tools allow users to access information, tools and people located anywhere in the organisation. Workers should also have up-to-date organisational information. Timely knowledge of any changes will ensure the best performance of the organisation.

How the Prototype Demonstrates This

3.8.1.1.Example: ORGANISATION-WIDE TOOLS

Examples of organisation-wide tools are the Navigation Tool and the Communications Tool, whose functions span the entire organisation, and which are available to all users. The Navigation Tool enables resource discovery by providing the means to navigate through an organisation in a variety of ways; while the Communications Tool is used to contact other CSS users.

Note: The Navigation Tool is described in the concept: Find (Section 3.10).

Note: The Communications Tool is described in the concept: Communication (Section 3.9).

3.8.1.2.Example: UP-TO-DATE ORGANISATIONAL INFORMATION

The Organisation Tool can be used to modify the representation of the organisation's structure—for example, new detachments can be added as subordinates to existing organisation units. Corresponding assets can be re-allocated using the same tool.

Several tools and views depend on the structure of the organisation, and need to be evolved along with structural alterations—for example, the rows of a Wing tasking board are related to the aircraft within their squadrons. If new detachments are formed for a Wing, their details must also appear on the tasking board. The tasking board's structure can be modified manually using the Define View Tool, which accesses the CSS's current representation of the organisation's structure and its assets. Details of the new detachment can be appended easily to the board, and other squadron information can be refreshed.

Figure 34 shows how the Organisation Tool is used to add a detachment. Figure 35 illustrates the re-allocation of assets.

The modification of the 81 Wing Tasking board to include Detachment A, and the refreshment of 3SQN information takes place via a screen similar to that shown in Figure 15.

All parts of the organisation can be kept up-to-date on any major structural changes—information and tools are updated quickly and easily.

Other Notes

See Concept: Organisation Awareness (Section 3.14).

See Concept: Find (Section 3.10).

See Concept: Communication (Section 3.9).

3.9. Communication

The ability to communicate with anyone, anywhere in the organisation is an underlying part of the CSS environment. It enables distributed decision-making. This concept is concerned with the sharing of information among people to solve problems.

A range of services are available for communication to take place, such as electronic mail, audio and video. A RAAF CSS should be able to support interactive communications such as conversations along with non-interactive ones such as electronic mail. Multiple communications should be sustainable simultaneously.

How the Prototype Demonstrates This

There are two ways of communicating in the Prototype: either using the Communication Tool or via Blackboards. The differences between these two methods of communication are summarised in the table below.

Blackboards	Communications Tool
• Non-interactive	• Interactive or Non-interactive
• Routine situations	• Routine or Novel situations
• Formal groups	• Informal groups (short period of time)
• Informal groups (long period of time) using dynamically created blackboards	

Blackboards, used for communication in formal groups, are setup for organisation units consisting of individuals with different types of expertise, to handle particular types of work tasks. Specialists and experts possibly belonging to different organisation units, may be required to operate collaboratively in order to solve problems—the Communications Tool allows interactive distributed problem-solving to take place between these users. Novel situations, in particular emergencies, may demand the rapid formation of dynamic informal groups, who are able to communicate via dynamically-created blackboards—especially when such interactions occur over long periods of time.

3.9.1.1.Example: COMMUNICATIONS TOOL—Interactive Communication

This tool allows users to access a variety of communication services. It also provides them with the flexibility to match services with particular users; whereby the most appropriate services are selected to perform work tasks.

For example, the 81 Wing OPSO may setup a desktop conference, using voice and video, to discuss certain air tasking details with OPSOs at other wings. In one case, 82 Wing OPSO may be contacted to process an Air Tasking Order Request for a maritime strike which requires the use of F-111s. It is expected that the OPSOs should be able to see and hear each other as they talk, and to use an interface similar to the one shown in Figure 27, which illustrates how two users can conduct an interactive conversation.
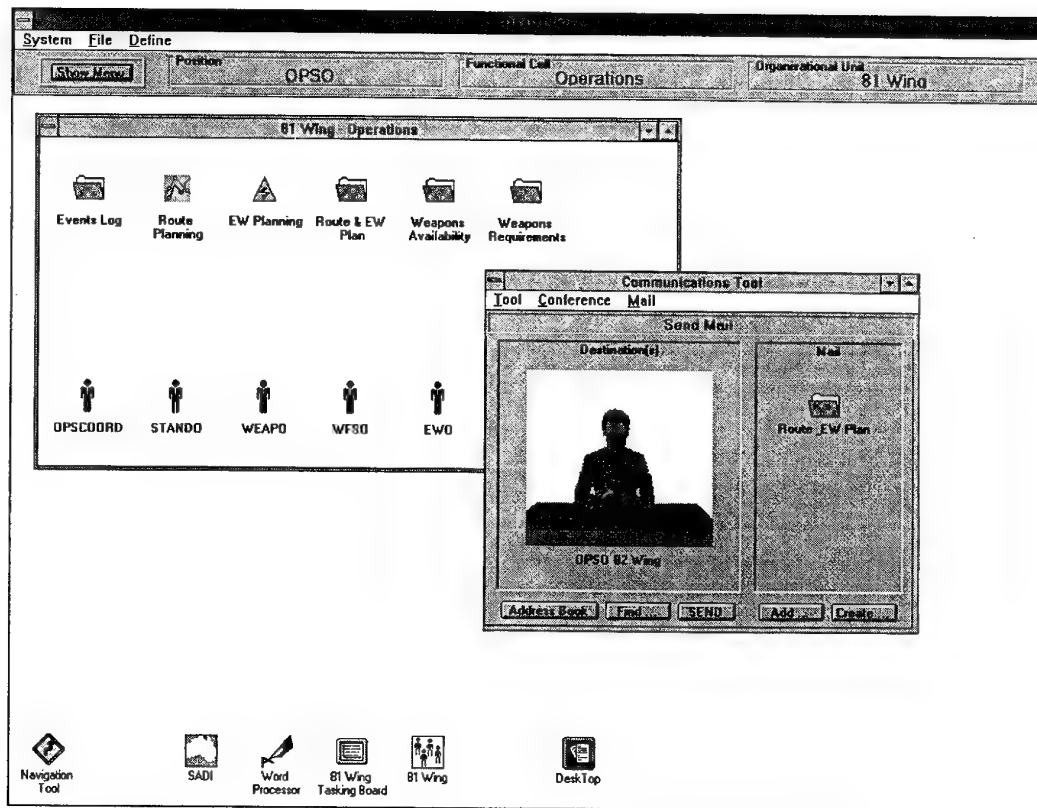
Figure 27. OPSO 81 Wing OPSO uses the Communications Tool for a desktop conference with OPSO 82 Wing.

Information such as Route and EW Plans may be exchanged also during conversations. The Prototype demonstrates this through the simple action of clicking, dragging, and dropping the document onto the right hand side of the tool, and clicking the *Send* button to send it—also shown in Figure 27.

3.9.1.2.Example: BLACKBOARDS (Non-Interactive Communication)

An example of non-interactive communication is the exchanging of documents via blackboards. Documents can be dragged and dropped from one work area to others. In this way, information placed on blackboards is shared among the group members— for example, briefs on the Battle Staff blackboard, as shown in Figure 28, can be viewed by all members of the Battle Staff.
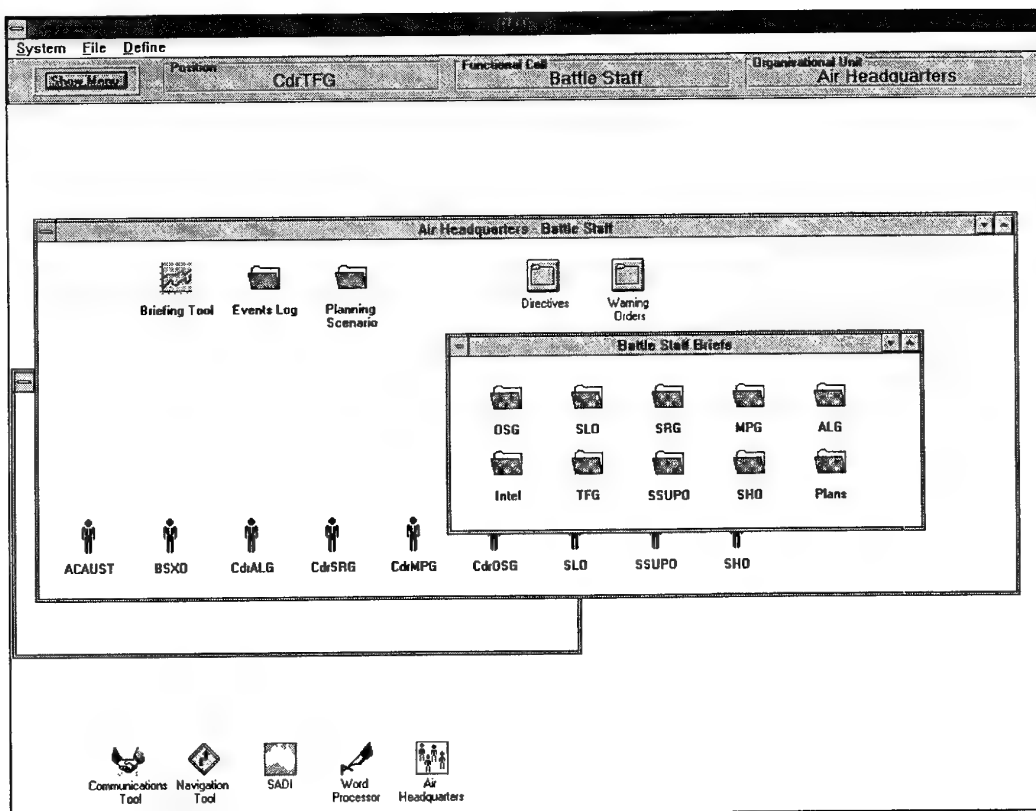
Figure 28.   Battle Staff briefs on the Air Headquarters—Battle Staff Blackboard.

Implementation Notes

The Navigation Tool can be used to invoke the Communications Tool, simply by dropping information or roles onto it. Note: the Prototype does not have a real mail implementation. Mail information can be simulated using shared files stored on a network.

Other Notes

See Concept: The ability to support work for groups (Section 3.7).

Things Not in Prototype

The Communication Tool demonstrates communication between two people only; it does not demonstrate interactive group communication.

Video and audio support are not implemented.

3.10. Find

Information is used to perform tasks. This Concept relates to the ability to *Find* (locate) information, *Search* (look) for information, to *Discover* (find new) information, and to *Navigate* through information (find information within structures).

Users should be able to search for any organisation resource. Users' individual access to the totality of resources, their *Search* space, is customised to the roles and tasks which they perform as individuals. In the Prototype, users can find information whether its existence and location is known or not, by using context-sensitive searches and by viewing their available resources from multiple perspectives. The usual starting points for finding information in an organisation are other people.

How the Prototype Demonstrates This

The Navigation Tool and blackboards are used to find information, depending on whether the existence and location of such information is known or unknown. Possible combinations are presented in the matrix below.

LOCATION

		Known	Unknown
	Known	Blackboards	Navigation Tool (search)
EXISTENCE	Unknown		Navigation Tool or Communication Tool (discovery)

Figure 29. How information is found.

3.10.1.1. Example: NAVIGATION TOOL—Where Existence is Known, Location Unknown

The Navigation Tool displays information in structured formats—for example, the hierarchical display of organisation structure. All searches are context-sensitive, so that searches of information can be conducted based on previously-selected criteria. The screen display presented in Figure 30 presents a list of all positions within the organisation unit 81 Wing Managerial. In this way, the location of OC81Wing can be found within 81 Wing to access information or initiate a conversation. Users can change their views of search spaces by selecting different search criteria.

3.10.1.2. Example: BLACKBOARDS—Existence is Known, Location Known

Blackboards, which reflect inherent organisation structures, represent the resources available to a group which individuals have permission to access. Individuals can use blackboards to obtain known information, such as Aircraft Availability details from the Logistics functional cell of the 81 Wing Organisation Unit blackboard, as shown in Figure 26.

3.10.1.3. Example: COMMUNICATIONS TOOL—Existence is Unknown, Location Unknown

People are contacted to discuss problems with. During such conversations, they may discover that information exists of which they had no prior knowledge.

Note: The Communications Tool is described in the concept: Communication (Section 3.9).
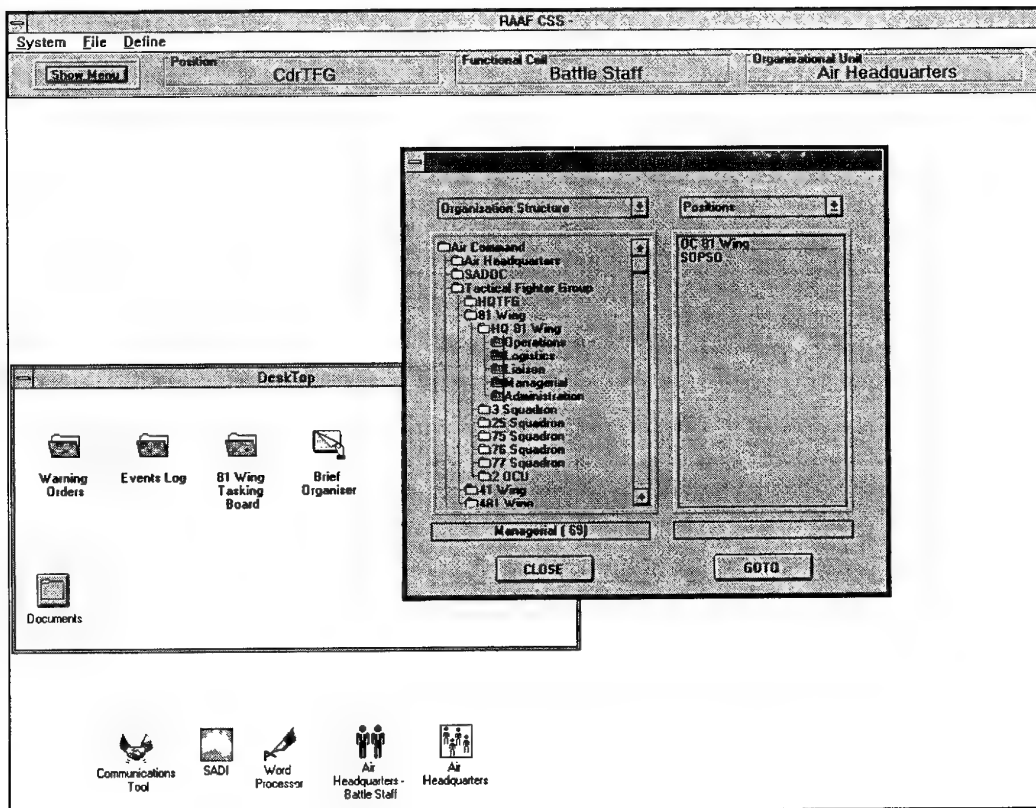
Figure 30. Using the Navigation Tool to find OC81Wing in the organisation structure.

Implementation Notes

The Navigation Tool's GOTO button is a direct link to blackboards for organisation units, thereby connecting the Navigation Tool and blackboards.

Other Notes

See Concept: Information Space (Section 3.1).

See Concept: The ability to support work for groups (Section 3.7).

See Concept: Communication (Section 3.9).

Things Not in Prototype

The Navigational Tool's search space is not customised to the roles and tasks performed by individuals.

Finding information in context is limited in its levels, wherein each search is a refinement of the prior one—for example, at present it is not possible to present a list of all the information associated with the OPSO of 81 Wing. Such an added functionality would allow searches to be narrowed down gradually so that closer studies of desired information are possible.

3.11. Situation Awareness and Assessment

Situation Awareness results from the ability to display the current situation. Users can monitor events as they occur, and can develop a common understanding of the state of the world.

Situation Assessment is the identification of problems and opportunities with current situation.

How the Prototype Demonstrates This

3.11.1.1.Example: SITUATION AWARENESS DISPLAY

Users have access to a personalised Situation Awareness Display—for example, a Mapping Tool which shows the current situation. This tool shows how objects such as bases, tracks and assets are related to each other spatially. It is assumed that up-to-date information is obtained from a variety of sensors and that the information displayed and its refreshment rate is determined by users' roles.

Figures 18 and 19 show a Situation Awareness Display.

Other Notes

The Recognised Air Picture is a specialised situation awareness display for Sector Air Defence operations.

Things Not in Prototype

Computer support for situation assessment is not provided; it is assumed that situation assessment is done by the user.

A *History of Events* is not implemented.

3.12. The Ability to Create and Visualise Plans

The Prototype provides a way of creating a graphical representation of a plan which includes situation information.

Planning covers the following steps:

- view the current state of the world
- review events leading up to that state
- project enemy situation into the future
- determine threats and opportunities
- plan a response—missions, re-allocation of assets
- detail plan—using multiple representations of information such as graphics, tables and text

- generate plan documents

How the Prototype Demonstrates This

3.12.1.1.Example: PLANNING TOOL

The Planning Tool is a special mapping tool which displays the current situation—much like a Situation Awareness Display—and is capable of replaying past events, by recalling saved records of incidents and projecting situations into the future.

Users may view several maps simultaneously to compare different situations or different interpretations of the same situation.

Figure 31 illustrates the Planning Tool with two maps displayed on the screen. One, the bottom map, presents an overview of the situation, while the other, the top map, presents the details. A dialogue box for recalling saved incidents appears on the bottom left of the screen.
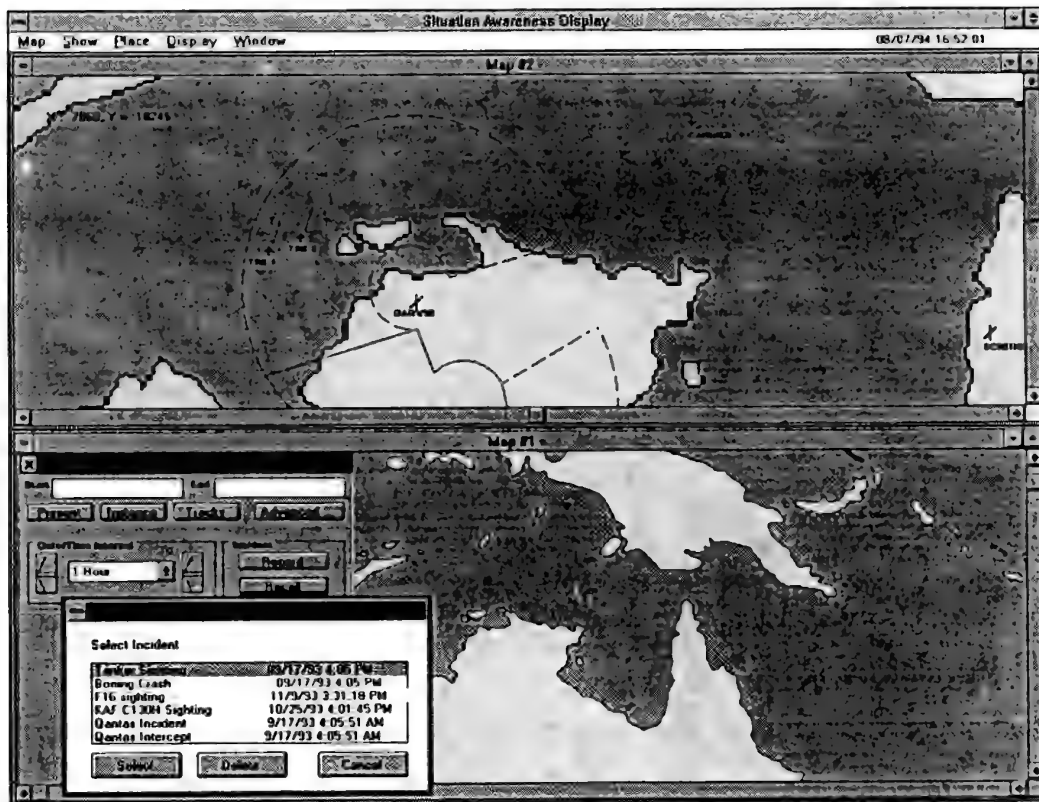
Figure 31. Planning Tool with two maps displayed.

Implementation Notes

In the Prototype the distinction between a Situation Awareness Display and a Planning Tool, lies in the way the Mapping Tool is used.

Things Not in Prototype

The ability to (visually) compare expected versus actual events.

A *Similar Situation* tool to search past events to find situations similar to the current one.

3.13. The Separation of Positions and Individuals

The Prototype recognises people according to their assigned role in the organisation, as well as by name. In this way a separation between positions and individuals is maintained.

Individuals enter the RAAF CSS Prototype by supplying their name and the title of the position held. Positions are responsible for performing sets of tasks using the information and tools associated with them.

Several people may perform the same role on a shift basis. Personnel log-on to the CSS as particular positions, and access the sets of information and tools available to them. Desktops however can be tailored for individuals.

Individuals can perform multiple roles (have multiple positions) in the organisation. If they perform roles concurrently, it should be possible for the individuals concerned to switch between different sessions on the CSS, where a session represents a different position. Alternatively, individuals can carry out their multiple roles from a single desktop. The tools and information available to them are a combination of those needed for their multiple roles.

How the Prototype Demonstrates This

Admittance to the CSS Prototype takes place at the Log-on screen (see Figure 32).
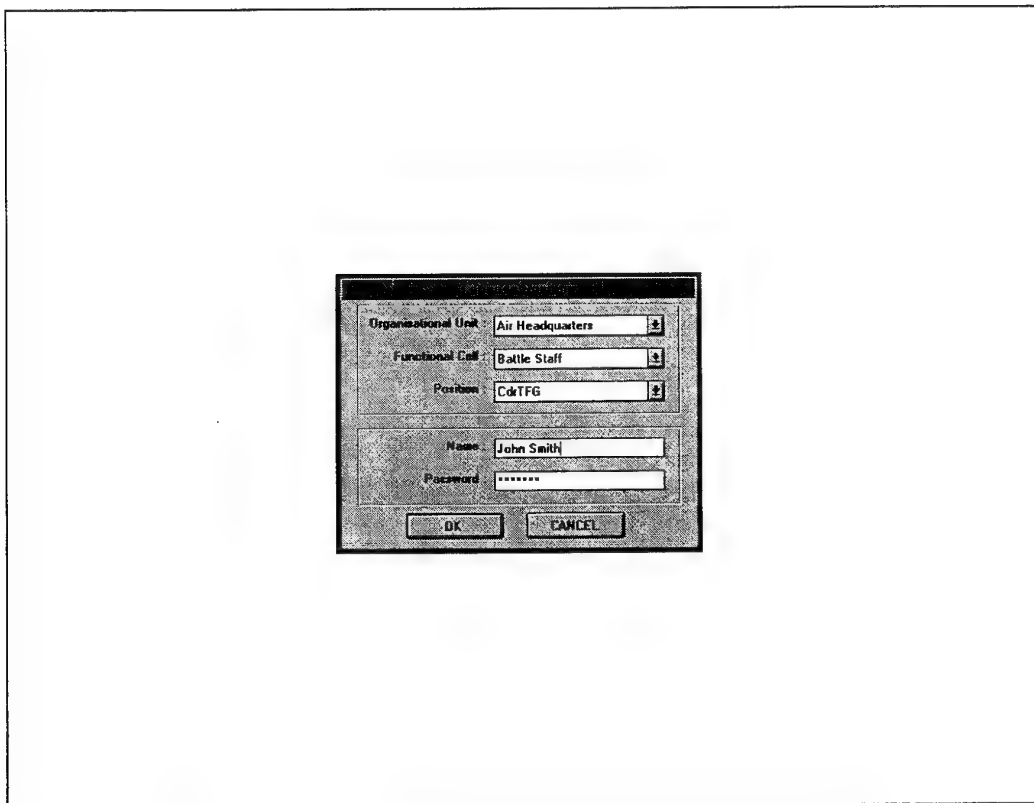
*Figure 32.   Initial Log-on screen, showing John Smith logging on as CDRTFG in the Battle
Staff at Air Headquarters.*

Users select the names of their organisation unit, functional cell, and their position,
which provides the organisation context in which they perform their work tasks. The
CSS also requires users' names and passwords to be supplied, to authenticate them as
users and to setup their desktops.

Users, once logged on to the system, can change their positions from within the
system. The transition between different positions, however, requires their logging off
as one position and logging on as another. This log-on procedure is identical to the
initial log-on procedure described above.

The screen display illustrated in Figure 33, shows a desktop for users who occupy
two positions concurrently. The desktop presents a union of the information, tools and
work areas required for both the CDRTFG and Plans TF at Air Headquarters. Two
panels at the top of the screen indicate which positions are active. The panels offer the
options to suppress or enable the desktop items associated with a particular position.
This offers users the choice of restricting themselves to one position at a time, or of
simultaneously operating with the combined resources provided by the multiple
positions.
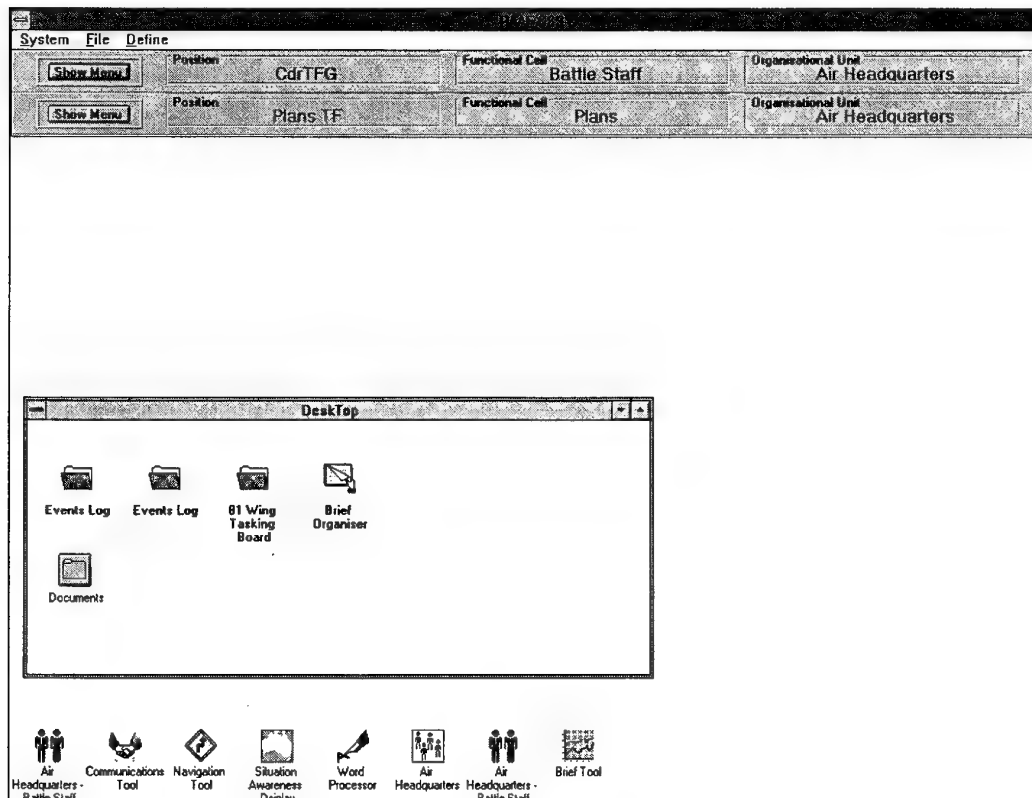
Figure 33. Combined desktop for CDR TFG and Plans TF at Air Headquarters.

3.14. Organisation Awareness

Users of a future RAAF CSS are always aware of the organisation in which they work, and their roles within it. The user is aware of the organisation's structure, its purpose, and the different types of work performed by specialist roles—all these require explicit representation in the system.

Organisations are structured to enable them to achieve their purposes—for example, the RAAF exists to perform air defence, to carry out maritime strikes, and so on. The organisation's structure reflects the many different types of work performed such as strategic and tactical planning in the RAAF. Within organisation units there are collections of roles, each with their own specialities and each providing different perspectives for problem-solving.

How the Prototype Demonstrates This

The concept is demonstrated throughout the Prototype, from the moment users log-on to the system. Users occupy positions identified by functional cells and organisation units within the RAAF.

At any time, users can display the organisation structure and use it to locate the information, tools, positions and other resources which they require and which are available to them throughout the organisation.

Note: This can be done using the Navigation Tool described in the concept: *Find*.

Other Notes

See Concept: The ability to support work for groups (Section 3.7).

See Concept: Find (Section 3.10).

Things Not in Prototype

The purpose of the organisation; a strategic plan; task and workflow models.

3.15. Flexibility and Adaptability of CSS

Users of a RAAF CSS vary in their positions, ranks, experience and individual preferences. Flexibility to support all potential users should be an integral part of the system. It is also essential that a CSS has the ability to adjust to changes in the organisation which it supports—changes in the organisation's resources and structure.

A future RAAF CSS should be flexible in the way it presents itself to users. The layout of the work areas and the materials held should be tailorable by the individuals who use them. This level of support should be maintained over time, as users' experiences and expertise develops. The system should also allow, even encourage, operators to complete tasks using alternative ways.

Change in organisations is inevitable. Personnel change their roles and positions, assets are re-allocated throughout the organisation, and command and control arrangements are modified. Changes may occur over a short time periods such as during the transition from peacetime to contingency operations, or more steadily over a longer period, with postings or the creation or restructuring of RAAF groups.

As the RAAF changes its structures and resources to meet the needs of new situations, the computer system needs to adjust to provide the support required to deal with such changes.

How the Prototype Demonstrates This—Flexibility

3.15.1.1. Example: TAILORED DESKTOPS

The Prototype presents how the layout of desktops can be customised for individuals occupying different positions. The tools and information are matched to positions—for example, CDRTFG, as part of the Battle Staff, has a Brief Organiser tool on his desktop, to produce briefs; while Wing OPSOs use tasking boards and respond to listings of new Air Tasking Order Requests to perform their tasks.

Note: Refer to the Prototype User Interface Reference section of this document for a complete list of the information and tools used by CDRTFG and OPSO 81 Wing.

3.15.1.2.Example: ALTERNATIVE METHODS TO ACHIEVE THE SAME RESULT

Blackboards, which give direct access to group resources, are useful for locating people and information. Items such as briefs can be dispatched simply by dragging the brief from the sender's desktop and dropping it onto the receiver's role symbol on the blackboard. This is one way CDRTFG sends briefs to OC81Wing.

The Communications Tool and the Navigation Tool can be used to achieve the same result. CDRTFG can use the Navigation Tool to locate the position of OC81Wing in the organisation hierarchy, and target and dispatch the brief using the Communications Tool once the connection is established between the two parties.

How the Prototype Demonstrates This—Adaptability

3.15.1.3.Example: ORGANISATION STRUCTURE

The CSS records the organisation's structure. When the system is notified of any alteration to the structure, the relevant resources should also be updated. In the Prototype the Organisation Tool can be used to dynamically modify the organisation structure.

Figure 34 shows how the Organisation Tool can be used to add new organisation units to the organisation, such as a detachment to a wing.
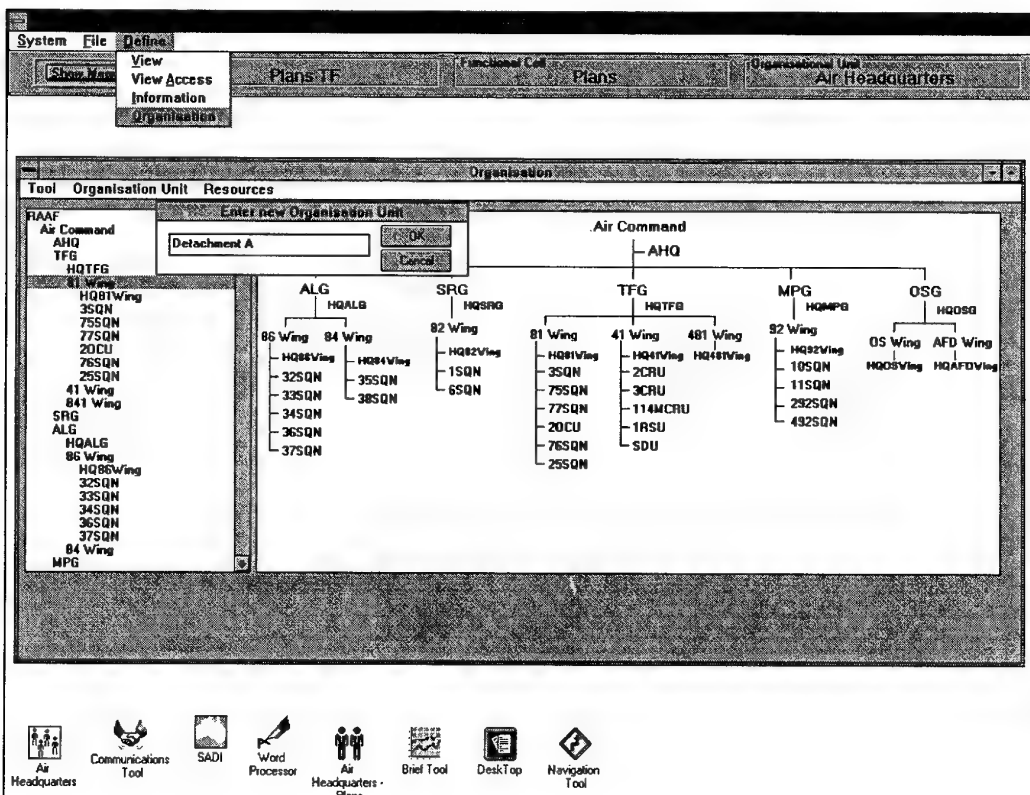
Figure 34.   Changing the organisation structure.

3.15.1.4. Example: RE-ALLOCATION OF AIRCRAFT

The Organisation Tool enables aircraft to be re-allocated to different squadrons. The tool allows asset details of organisation units to be displayed and changed with ease, as shown in Figure 35.
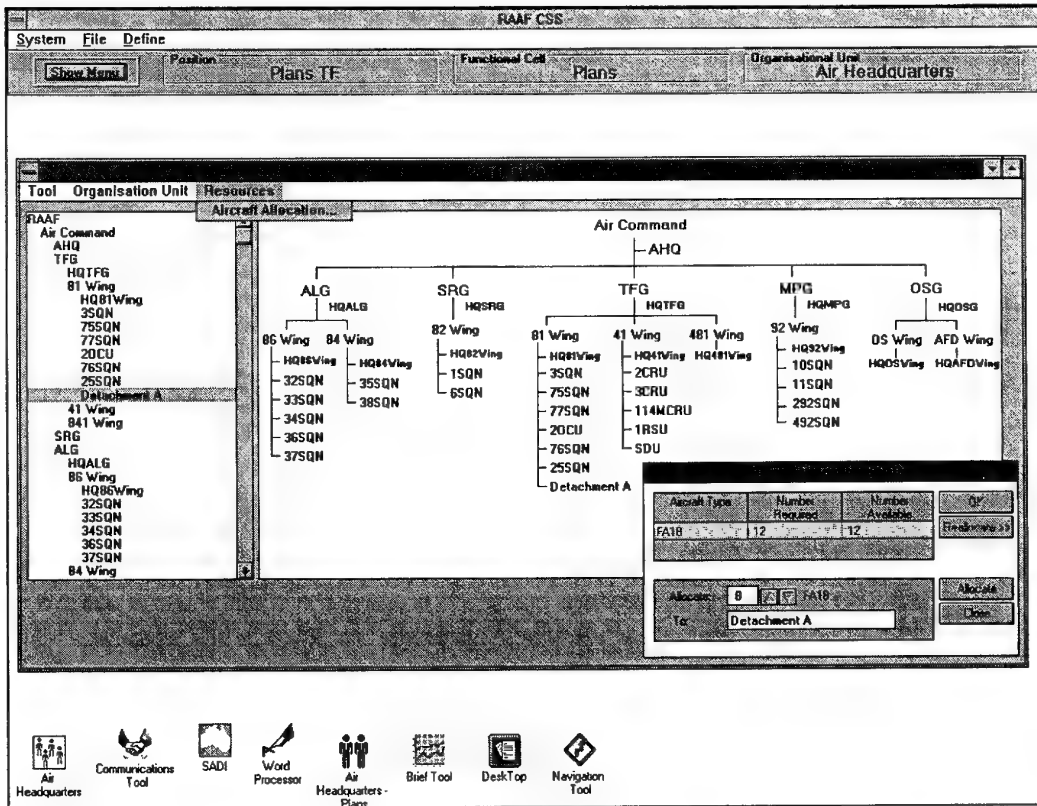
Figure 35. Re-allocating assets between different organisation units.

3.16. Share

The RAAF CSS Prototype was designed around the ability to share ideas, understanding, information and knowledge—this Concept, therefore, necessarily includes all other Concepts.

Generally *Share* refers to the exchange, availability and ease of finding information.

To achieve an organisation's purpose, people in the organisation must have a shared understanding of what they are doing and how their work fits in with that performed by others. Shared understanding is enabled by sharing plans which encapsulate information, knowledge and ideas about what work tasks will be performed and how they will be executed.

Shared information and understanding enables the organisation to function for decision-making in routine situations. When facing novel situations, the underlying information and knowledge needs to be shared about the situation to enable a shared understanding of the problem to develop and to derive a solution.

The information space, blackboards and views enable information sharing in routine situations.

The Communication Tool, the Navigation Tool, and briefs all enable the sharing of information and knowledge rapidly in novel situations.

How the Prototype demonstrates this

3.16.1.1. Example: SHARING TASKING INFORMATION

The 81 Wing Tasking Board is used predominantly by the OPSO at 81 Wing. Among the Battle Staff, CDRTFG has a view of this particular tasking board—the same information is used for the different types of work tasks performed throughout the organisation.

Implementation Notes

In the Prototype CDRTFG has an actual copy, not just a view of the 81 Wing OPS Tasking board.

Other Notes

See Concept: Information Space (Section 3.1).

See Concept: Extract more detailed information from some general information—to *drill down* (Section 3.2).

See Concept: A piece of information can have several formats (Section 3.3).

See Concept: The integration of different information formats to form a view (Section 3.4).

See Concept: The integration of different views (Section 3.5).

See Concept: The ability to support work for individuals (Section 3.6).

See Concept: The ability to support work for groups (Section 3.7).

See Concept: The ability to support work for the organisation (Section 3.8).

See Concept: The separation of positions and individuals (Section 3.13).

See Concept: Organisation Awareness (Section 3.14).

See Concept: Flexibility and Adaptability of CSS (Section 3.15).

See Concept: Communication (Section 3.9).

See Concept: Find (Section 3.10).

See Concept: Situation Awareness and Assessment (Section 3.11).

See Concept: The ability of create and visualise plans (Section 3.12).

4. Prototype User Interface Reference

This section records the Prototype's user interface in the form of four lists: an icon list, a positions list, a tool list and an information list. These lists can be used to identify and locate different elements of the prototype.

4.1. List Descriptions

Brief descriptions of the icon list, positions list, tool list and information list, appear below.

4.1.1. Icon List Description

The RAAF CSS Prototype uses icons to represent tools, information, blackboards, people, and groups of all of the above, in their minimised form. Icons allow the easy identification of items on the screen, and provide consistency across the interface. They also conserve space—allowing items to be minimised and grouped; as well as enabling items to be moved, via the mouse, by *dragging* and *dropping*.

A list of all the icons used in the Prototype, identified by type, name and location, is presented in this section.

4.1.2. Positions List Description

The five positions that have been implemented in the Prototype are:

Position	Functional Cell	Organisation Unit
CDRTFG	Battle Staff	Air Headquarters
Plans TF	Plans	Air Headquarters
OPSO	Operations	81 Wing
SADC	Managerial	SADOC
OPSO	Operations	Detachment A

This section lists all the roles, tools and information that can be accessed by each position.

4.1.3. Tool List Description

The tools in the Prototype have been classified according to the areas of Distributed Decision-making, Situation Awareness, Situation Assessment and Planning, and Other tools.

Tables have been produced for each tool category; they list the tools, the people who have access to the tools, and their location. These tables can be used to locate any tool in the Prototype.

4.1.4. Information List Description

This section has a table which lists all the information used in the Prototype, the people who have access to the information, and their location. This table can be used to locate any information used in the Prototype.

4.2. Icon List

Table 1.   Icon List.

Icon	Type	Name	Location
	Prototype	RAAF CSS Prototype	A program group within Microsoft Windows Program Manager
	Work Area	Desktop	Microsoft Windows desktop
	Role	Role	Functional Cell Blackboard
	Work Area	Functional Cell Blackboard	Microsoft Windows desktop Organisation Unit Blackboard
	Work Area	Organisation Unit Blackboard	Microsoft Windows desktop
	Tool	Situation Awareness Display Recognised Air Picture	Microsoft Windows desktop
	Tool	Navigation Tool	Microsoft Windows desktop
	Tool	Communications Tool	Microsoft Windows desktop
	Tool View	Board Tool Board View	Microsoft Windows desktop Desktop
	Tool	Brief Organiser	Desktop for CDRTFG
	Tool	Briefing Tool	Microsoft Windows desktop for Plans TF Battle Staff functional cell blackboard for CDRTFG
	Tool	EW Planning Tool	Operations function cell blackboard for OPSO 81 Wing
	Tool	Route Planning Tool	Operations function cell blackboard for OPSO 81 Wing
	Tool	Word Processor	Microsoft Windows desktop
	Information	General	Desktop Functional Cell Blackboard Organisation Unit Blackboard
	Folder	General	Desktop Functional Cell Blackboard Organisation Unit Blackboard

4.3.   Positions List

The positions that have been implemented in the Prototype are:

Position	Functional Cell	Organisation Unit
CDRTFG	Battle Staff	Air Headquarters
Plans TF	Plans	Air Headquarters
OPSO	Operations	81 Wing
SADC	Managerial	SADOC
OPSO	Operations	Detachment A

The following tables list all the tools and information belonging to each of the above positions, and the roles they have access to.

Notes:

1.   Items printed in italics are those which do NOT exist in the demonstration version of the Prototype.

2.   Items suffixed by an asterisk are those which may be executed (by double-clicking).

3.   Some items are only visible once a particular action has taken place, for example, if a hidden button has been clicked during a demonstration. A desciption of these actions appear in brackets.

Please refer to Annex B for information on hidden buttons.

4.   The 81 Wing organisation unit blackboard is displayed when CDRTFG selects the GOTO button on the Navigation Tool. Its contents are shown below:

> Functional Cells:
> - Managerial
>   └ *Roles:* OC81Wing, SOPSO
>   └ *Information:* Events Log, Summary
> - Liaison
> - Operations
> - Logistics
> - Administration

Table 2   *CDRTFG, Battle Staff, Air Headquarters—Roles, Tools and Information.*

	Roles	Tools	Information
MS Windows Desktop	(none)	Communications Tool Navigation Tool Situation Awareness Display Word Processor	(none)
Desktop (Window)	(none)	Brief Organiser	Warning Orders Events Logs 81 Wing Tasking Board* (click hidden button 1) OPINST01* (click Brief Organiser Quit

			button) Brief
Desktop (Window) Documents Folder	(none)	(none)	Battle Staff Brief Report
Air Headquarters - Battle Staff Functional Cell Blackboard	ACAUST BSXO CDRALG CDRSRG CDRMPG CDROSG SLO SSUPO SHO	Briefing Tool	Events Log Planning Scenario
Air Headquarters - Battle Staff Battle Staff Briefs Folder	(none)	(none)	OSG, SLO, SRG, ALG, MPG, Intel*, TFG*, SSUPO, SHO, Plans
Air Headquarters - Battle Staff Directives Folder	(none)	(none)	*Directive #123* *Directive #188* *Directive #210*
Air Headquarters - Battle Staff Warning Order Folder	(none)	(none)	*Warning Order #15* *Warning Order #17*
Air Headquarters Organisation Unit Blackboard	(none)	(none)	Events Log News
Air Headquarters Directives Folder	(none)	(none)	(none)
Air Headquarters Administration Functional Cell	SADMINO	(none)	Duty Roster
Air Headquarters Finance Functional Cell	(none)	(none)	(none)
Air Headquarters Intelligence Functional Cell	Plans Monitoring Analysis	(none)	IntReps IntSums*
Air Headquarters Health Functional Cell	(none)	(none)	(none)
Air Headquarters Law Functional Cell	(none)	(none)	(none)
Air Headquarters Logistics Functional Cell	(none)	(none)	(none)
Air Headquarters Liaison Functional Cell	(none)	(none)	(none)
Air Headquarters NADOC Functional Cell	(none)	(none)	(none)
Air Headquarters Operations Functional Cell	DBSXO OPSCONT OPSO SAR	(none)	*82 Wing tasking board* *84 Wing tasking board* *86 Wing tasking board* *92 Wing tasking board*
Air Headquarters Plans Functional Cell	(none)	(none)	(none)

Table 3. Plans TF, Plans, Air Headquarters—Roles, Tools and Information.

	Roles	Tools	Information
MS Windows Desktop	(none)	Communications Tool Navigation Tool Situation Awareness Display Word Processor Brief Tool	(none)
Desktop (Window)	(none)	(none)	Events Log

Desktop (Window) Documents Folder	(none)	(none)	(none)
Air Headquarters - Plans Functional Cell Blackboard	Plans CE Plans AD EW Plans Weapon Plans Plans Recce Plans Strike Plans Air Lift Plans Maritime Plans OSG	(none)	Events Log
Air Headquarters Organisation Unit Blackboard	(none)	(none)	Events Log News
Air Headquarters Directives Folder	(none)	(none)	(none)
Air Headquarters Administration Functional Cell	(none)	(none)	(none)
Air Headquarters Battle Staff Functional Cell	ACAUST BSXO CDRALG CDRSRG CDRMPG CDRTFG SLO SSUPO SHO	(none)	(none)
Air Headquarters Operations Functional Cell	(none)	(none)	(none)
Air Headquarters NADOC Functional Cell	(none)	(none)	(none)
Air Headquarters Logistics Functional Cell	(none)	(none)	(none)
Air Headquarters Liaison Functional Cell	(none)	(none)	(none)
Air Headquarters Law Functional Cell	(none)	(none)	(none)
Air Headquarters Intelligence Functional Cell	Plans Monitoring Analysis	(none)	IntReps IntSums*
Air Headquarters Health Functional Cell	(none)	(none)	(none)
Air Headquarters Finance Functional Cell	(none)	(none)	(none)

Table 4.   OPSO, Operations, 81 Wing—Roles, Tools and Information.

	Roles	Tools	Information
MS Windows Desktop	(none)	Communications Tool Navigation Tool Situation Awareness Tool (SADI) Word Processor 81 Wing Tasking Board	(none)
Desktop (Window)	(none)	(none)	New ATRs* (click hidden button 2) New OPORD* (click hidden button 3)

			Route & EW Plan
Desktop (Window) Documents Folder	(none)	(none)	(none)
81 Wing - Operations Functional Cell Blackboard	OPSCOORD STANDO WEAPO WFSO EWO	Route Planning EW Planning	Events Log Route & EW Plan Weapons Availability* Weapons Requirements
81 Wing Organisation Unit Blackboard	(none)	(none)	(none)
81 Wing Managerial Functional Cell	OC81Wing SOPSO	(none)	(none)
81 Wing Logistics Functional Cell	LOGENG SUPO	(none)	Aircraft Availability* Config. and Mod. Board* AME Status* Tindal Base Supply Info.* Darwin Base Supply Info. Williamtown Base Supply Info.
81 Wing Liaison Functional Cell	(none)	(none)	(none)
81 Wing Administration Functional Cell	(none)	(none)	(none)

Table 5.   SADC, Managerial, SADOC - Roles, Tools and Information.

	Roles	Tools	Information
MS Windows Desktop	(none)	Communications Tool Navigation Tool Word Processor Recognised Air Picture	(none)
Desktop (Window)	(none)	(none)	Alert Status Board* Aircraft Call Signs and Comms.* ROE*
Managerial Functional Cell Blackboard	DSADC SADEX	(none)	(none)
SADOC Organisation Unit Blackboard	(none)	(none)	(none)
SADOC Administration Functional Cell	(none)	(none)	(none)
SADOC SCC Functional Cell	(none)	(none)	(none)
SADOC CCC Functional Cell	(none)	(none)	(none)
SADOC Intelligence Functional Cell	(none)	(none)	(none)
SADOC Operations Functional Cell	(none)	(none)	(none)
SADOC Liaison Functional Cell	(none)	(none)	(none)

Table 6.   OPSO, Operations, Detachment A - Roles, Tools and Information.

	Roles	Tools	Information
MS Windows Desktop	(none)	Communications Tool Navigation Tool Word Processor Recognised Air Picture Alert Satus Board	(none)
Desktop (Window)	(none)	(none)	(none)
Operations Functional Cell Blackboard	WEAPO	(none)	(none)
Detachment A Organisation Unit Blackboard	(none)	(none)	(none)
Detachment A Managerial Functional Cell	(none)	(none)	(none)
Detachment A Intelligence Functional Cell	(none)	(none)	(none)

4.4.   Tool List

The tools in the prototype have been classified according to the areas of Distributed Decision-making, Situation Awareness, Situation Assessment and Planning, and Other tools.

4.4.1. Distributed Decision-making Tools

Navigation Tool
Communications Tool
Brief Organiser
Briefing Tool
Role Tool
Organisation Structure Tool
Information Tool
View Tool
Access Tool

4.4.2. Situation Awareness Tools

Mapping Tool
Situation Awareness Display
Recognised Air Picture Tool
81 Wing Tasking Board
Alert State Board

4.4.3. Situation Assessment and Planning Tools

Planning (map-based) Tool
Route Planning Tool
EW Planning Tool
Resource Allocation Tool

4.4.4. Other
Word Processor

Tables have been produced for each tool category; they list the tools, the people who have access to the tools, and their location. These tables can be used to locate any tool in the Prototype.

Table 7.   Distributed Decision-making Tools.

Distributed Decision-making Tools		
Tool	Who has access to it	Location
Navigation Tool	All	Microsoft Windows Desktop
Communications Tool	All	Microsoft Windows Desktop
Brief Organiser	CDRTFG	Desktop
Briefing Tool	CDRTFG Plans TF	Battle Staff functional cell blackboard Microsoft Windows Desktop
Role Tool	All	Panel menu - Change option
Organisation Structure Tool	Plans TF / All	Define Organisation menu option
Information Tool	All	Define Information menu option
View Tool	Plans TF / All	Define View menu option
Access Tool	All	Define View Access menu option

Table 8.   Situation Awareness Tools.

Situation Awareness Tools		
Tool	Who has access to it	Location
Mapping Tool	All	Microsoft Windows Desktop
Situation Awareness Display	CDRTFG Plans TF OPSO, 81 Wing	Microsoft Windows Desktop Microsoft Windows Desktop Microsoft Windows Desktop
Recognised Air Picture	SADC OPSO, Detachment A	Microsoft Windows Desktop Microsoft Windows Desktop
81 Wing Tasking Board	OPSO, 81 Wing	Microsoft Windows Desktop
Alert State Board	SADC OPSO, Detachment A	Desktop Microsoft Windows Desktop

Table 9. *Situation Assessment and Planning Tools.*

Situation Assessment and Planning Tools		
Tool	Who has access to it	Location
Planning Tool	All	Microsoft Windows Desktop
Resource Allocation Tool	Plans TF / All	Define Organisation menu option
Route Planning Tool	OPSO, 81 Wing	Operations functional cell blackboard
EW Planning Tool	OPSO, 81 Wing	Operations functional cell blackboard

Table 10. *Other Tools.*

Other Tools		
Tool	Who has access to it	Location
Word Processor	All	Microsoft Windows Desktop

4.5. Information List

The following table can be used to locate any information used in the Prototype.

Notes:

1.   Items printed in italics are those which do NOT exist in the demo version of the prototype.

2.   Items suffixed by an asterisk are those which may be executed (by double-clicking).

3.   Some items are only visible once a particular action has taken place, for example, if a hidden button has been clicked during a demonstration. A desciption of these actions appear in brackets.

Please refer to Annex B for information on hidden buttons.

Table 11. *Information List.*

Information	Who has access to it	Location
81 Wing Tasking Board*	CDRTFG	Desktop
*82 Wing Tasking Board**	*CDRTFG*	*Air Headquarters blackboard (Operations functional cell)*
*84 Wing Tasking Board**	*CDRTFG*	*Air Headquarters blackboard (Operations functional cell)*

*86 Wing Tasking Board**	*CDRTFG*	*Air Headquarters blackboard (Operations functional cell)*
*92 Wing Tasking Board**	*CDRTFG*	*Air Headquarters blackboard (Operations functional cell)*
Aircraft Availability*	OPSO, 81 Wing	81 Wing blackboard (Logistics functional cell)
Aircraft Call Signs and Comms.*	SADC	Desktop
ALG (Brief)	CDRTFG	Battle Staff functional cell blackboard (Battle Staff briefs folder)
AME Status*	OPSO, 81 Wing	81 Wing blackboard (Logistics functional cell)
Battle Staff Briefs	CDRTFG	Desktop (Documents folder)
Brief (Click Brief Organiser Quit button)	CDRTFG	Desktop
Config. and Mod. Board*	OPSO, 81 Wing	81 Wing blackboard (Logistics functional cell)
Darwin Base Supply Info.	OPSO, 81 Wing	81 Wing blackboard (Logistics functional cell)
Directive #123	*CDRTFG*	*Battle Staff functional cell (Directives folder)*
Directive #188	*CDRTFG*	*Battle Staff functional cell (Directives folder)*
Directive #210	*CDRTFG*	*Battle Staff functional cell (Directives folder)*
Duty Roster	*CDRTFG*	*Air Headquarters blackboard (Administration functional cell)*
Events Log	CDRTFG Plans TF OPSO, 81 Wing	Desktop Battle Staff functional cell blackboard Air Headquarters blackboard Desktop Plans functional cell blackboard Air Headquarters blackboard Operations functional cell blackboard
IntReps	CDRTFG Plans TF	Air Headquarters blackboard (Intelligence functional cell) Air Headquarters blackboard (Intelligence functional cell)
IntSums*	CDRTFG Plans TF	Air Headquarters blackboard (Intelligence functional cell) Air Headquarters blackboard (Intelligence functional cell)

Intel* (Brief)	CDRTFG	Battle Staff functional cell blackboard (Battle Staff briefs folder)
MPG (Brief)	CDRTFG	Battle Staff functional cell blackboard (Battle Staff briefs folder)
New ATRs*	OPSO, 81 Wing	Desktop
New OPORD* (Click hidden button 2)	OPSO, 81 Wing	Desktop
News	CDRTFG Plans TF	Air Headquarters blackboard Air Headquarters blackboard
OPINST01* (Click hidden button 1)	CDRTFG	Desktop
OSG (Brief)	CDRTFG	Battle Staff functional cell blackboard (Battle Staff briefs folder)
Planning Scenario	CDRTFG	Battle Staff functional cell
Plans (Brief)	CDRTFG	Battle Staff functional cell blackboard (Battle Staff briefs folder)
Report	CDRTFG	Desktop (Documents folder)
ROE*	SADC	Desktop
Route & EW Plan (Click hidden button 3)	OPSO, 81 Wing	Desktop
Route & EW Plan	OPSO, 81 Wing	Operations functional cell blackboard
SHO (Brief)	CDRTFG	Battle Staff functional cell blackboard (Battle Staff briefs folder)
SLO (Brief)	CDRTFG	Battle Staff functional cell blackboard (Battle Staff briefs folder)
SRG (Brief)	CDRTFG	Battle Staff functional cell blackboard (Battle Staff briefs folder)
SSUPO (Brief)	CDRTFG	Battle Staff functional cell blackboard (Battle Staff briefs folder)
Tindal Base Supply Info.*	OPSO, 81 Wing	81 Wing blackboard (Logistics functional cell)
TFG* (Brief)	CDRTFG	Battle Staff functional cell blackboard (Battle Staff briefs folder)
Warning Orders	CDRTFG	Desktop
Warning Order #15	CDRTFG	*Battle Staff functional cell blackboard (Warning Orders folder)*
Warning Order #17	CDRTFG	*Battle Staff function cell blackboard (Warning Orders folder)*
Weapons Availability*	OPSO, 81 Wing	Operations functional cell blackboard

Weapons Requirements	OPSO, 81 Wing	Operations functional cell blackboard
Williamtown Base Supply Info.	OPSO, 81 Wing	81 Wing blackboard (Logistics functional cell)

5.   Glossary

Blackboard A mechanism for sharing information, tools, and tasks among people.

Desktop A work area for an individual, where information is created and manipulated using tools for a purpose. A desktop may contain multiple blackboards allowing the user to access several groups.

Functional Cell A collection of related specialist knowledge within an organisation unit.

For example, the Operations functional cell within HQ81Wing contains the specialist Operational knowledge (air tasking, weapons, electronic warfare, etc). Functional cells are implemented using blackboards.

Group Several people with a common interest who share information and communicate with each other, to carry out their work. Groups can be set up on a formal or informal basis. Examples of formal groups are functional cells and organisation units.

Individual A single user who performs one or more roles in the organisation.

Information Data that is relevant to a user.

For example, *6 aircraft available* is data, while *5 P-3Cs available at Edinburgh and 1 P-3C available at Darwin* is information to an OPSO at 92 Wing.

Organisation Unit A collection of different types of knowledge required to perform a particular type of work.

For example, HQ81Wing contains specialists with different types of knowledge required to perform the planning of fighter operations. Organisation Units are implemented using blackboards.

Position A name for a role.

Role   The authority and responsibility for performing a type of work. The responsibility is usually defined as a list of duties and a set of tasks.

For example, the role OPSO at a wing headquarters may be responsible for performing the tasks associated with air tasking.

Task   A piece of work that is performed.

Tool   A mechanism to create and manipulate information.

View   A representation of information that is customised to meet a particular user's requirements.

6.   Reference

1.   Clothier, J and O'Neill, J., *"Final Report of Task Air 93/025 RAAF Command Support Working Group Study"*, Project Report, 1994.

2.   Clothier, J and O'Neill, J., *"RAAF Command and Control: An Organisational Analysis Perspective"*, Project Report, 1994.

3.   Harrison, G., *"Prototype Technical Documentation"*, July 1994.

4.   Clothier, J and O'Neill, J., *"An Operator's Perspective of RAAF Command Support Systems"*, Project Report, 1994.

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Annex A

Integration of Information diagram

user can add   ·········▶ | Information Object |
info. types

1

instantiate   content to user

n

user can add   ·········▶ | Information |
information

1

allows greater assimilation   format
of information content   n

user can add   ·········▶ | Formatted Information | display to user
format types

n

adds more meaning to info.   integrate for a task
applies info to a task (for a purpose)   m

user can add   ·········▶ | View of Information | display to user
view types   1

integrate for a task

n

adds more meaning to info.
applies info to a task (for a purpose)

Information Space   = All information available to the organisation
= Information Objects (types or classes of information)
(structures and relations;
implicit relations between attributes
explicit relations between objects)
+ Object Instances (actual information)
(instances and semantic relations)

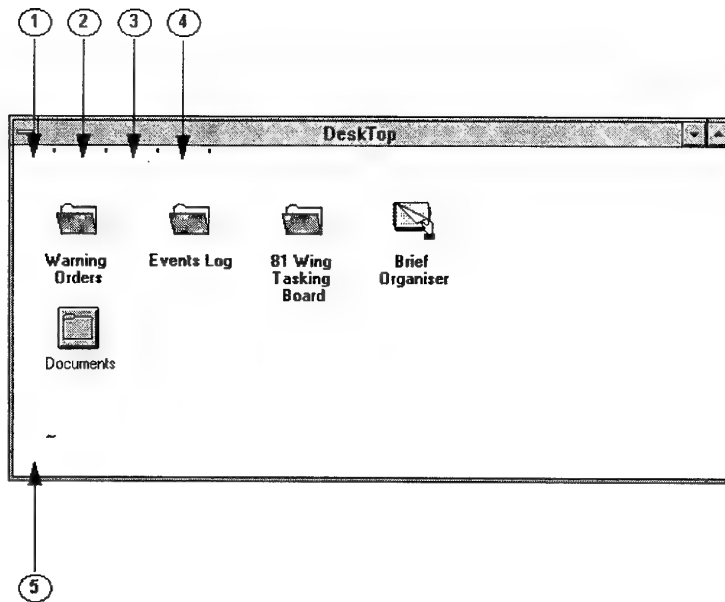THIS PAGE INTENTIONALLY BLANK

Annex B

Hidden Buttons

The screen display above shows the location of five hidden buttons used in demonstrating the prototype. These buttons are listed below with a description of what they do and the roles they relate to. Please note that only those buttons that relate to a role may be activated by that role.

Hidden Button	Role	Description
1	CDRTFG, Battle Staff, AHQ	OPINST from Plans TF appears on the desktop. This arrival is announced by a mail message.
2	OPSO, Operations, 81 Wing	OPORD from 81 Wing Plans appears on the desktop. This arrival is announced by a mail message.
3	OPSO, Operations, 81 Wing	Route and EW plan from OPSO 82 Wing appears on the desktop. This arrival is announced by a mail message.
4	OPSO, Operations, 81 Wing	Schedules the OPORD.
5	Plans TF, Plans, AHQ	Places the contents of ..\shared\mission.clp onto the clipboard.

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Malathi Carthigaser

(DSTO-TR-0271)

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HQADF

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Director General Force Development (Joint)	1

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Navy Scientific Adviser   1

Army Office

Scientific Adviser - Army   1

Air Office

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Air Commander, Australia	1
Director Communications and Information Systems - Air Force	1
Commander, AirLift Group	1
Commander, Maritime Patrol Group	1
Commander, Strike Reconnaissance Group	1
Commander, Tactical Fighter Group	1
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S01 Information Systems at Air Headquarters	1
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DOCUMENT CONTROL DATA SHEET

3a. AR Number	3b. Establishment Number	3c. Type of Report	4. Task Number
AR-009-423	DSTO-TR-0271	TECHNICAL REPORT	AIR 93/025

5. Document Date	6. Cost Code	7. Security Classification	8. No. of Pages	78
OCTOBER 1995	N/A	[U] [U] [U]	9. No. of Refs.	4

10. Title	Document Title Abstract
Prototype User Interfaces for Future RAAF Command Support Systems	S (Secret C (Confi) R (Rest) U (Unclass) * For UNCLASSIFIED docs with a secondary distribution LIMITATION, use (L) in document box.

11. Author(s)	12. Downgrading/ Delimiting Instructions
M. Carthigaser	N/A

13a. Corporate Author and Address	14. Officer/Position responsible for
Information Technology Division Electronics and Surveillance Research Laboratory PO Box 1500 SALISBURY SA 5108	Security N/A Downgrading N/A
13b. Task Sponsor Air Force	Approval for release Chief, ITD

15. Secondary Release Statement of this Document

APPROVED FOR PUBLIC RELEASE.

Any enquiries outside stated limitations should be referred through DSTIC, Defence Information Services, Department of Defence, Anzac Park West, Canberra, ACT 2600.

16a. Deliberate Announcement

No limitation.

16b. Casual Announcement (for citation in other documents)

[√] No Limitation   [ ] Ref. by Author, Doc No and date only

17. DEFTEST Descriptors	18. DISCAT Subject Codes
RAAF Command Support System User interface Computer Software	N/A

19. Abstract

Task Air 93/025 was a 12-month study conducted by the DSTO Command Support Systems Group which defined the broad capabilities required of a future RAAF Command Support System. A Prototype of a future RAAF Command Support System was produced to demonstrate the broad capabilities identified in the study. This document describes the user-interface and concepts demonstrated by the Prototype.